

Department of Public Works of Canada.

REPORTS
OF THE
International Waterways Commission
Canadian Section and
American Section
1905.

INTERNATIONAL WATERWAYS COMMISSION,
OFFICE OF CANADIAN SECTION.

OTTAWA, December 24, 1905.

SIR,—The Canadian Section of the International Waterways Commission has the honor to submit the following progress report.

The River and Harbor Act, passed by the United States Congress and approved June 13, 1902, contained the following provision, viz.:—

“The President of the United States is hereby requested to invite the Government of Great Britain to join in the formation of an international commission, to be composed of three members from the United States and three who shall represent the interests of the Dominion of Canada, whose duty it shall be to investigate and report upon the conditions and uses of the waters adjacent to the boundary lines between the United States and Canada, including all of the waters of the lakes and rivers whose natural outlet is by the River Saint Lawrence to the Atlantic Ocean, also upon the maintenance and regulation of suitable levels, and also upon the effect upon the shores of these waters and the structures thereon, and upon the interests of navigation by reason of the diversion of these waters from or change in their natural flow; and, further, to report upon the necessary measures to regulate such diversion, and to make such recommendations for improvements and regulations as shall best subserve the interests of navigation in said waters. The said Commissioners shall report upon the advisability of locating a dam at the outlet of Lake Erie, with a view to determining whether such dam will benefit navigation, and if such structure is deemed advisable, shall make recommendations to their respective governments looking to an agreement or treaty which shall provide for the construction of the same, and they shall make an estimate of the probable cost thereof. The President, in selecting the three members of said Commission who shall represent the United States, is authorized to appoint one officer of the Corps of Engineers of the United States Army, one civil engineer well versed in the hydraulics of the Great Lakes, and one lawyer of experience in questions of international and riparian law, and said Commission shall be authorized to employ such persons as it may deem needful in the performance of the duties hereby imposed; and for the purpose of paying the expenses and salaries of said Commission, the Secretary of War is authorized to expend from the amounts heretofore appropriated for the Saint Marys River at the Falls the sum of twenty thousand dollars, or so much thereof as may be necessary to pay that portion of the expenses of said Commission chargeable to the United States.”

The invitation authorized by this section was duly communicated to the Government of Great Britain by Honourable Jos. H. Choate, then American Ambassador in London, by a letter dated July 15, 1902 (copy appended, marked “A”).

On December 2, 1902, the invitation was transmitted by the Colonial Office in London to Lord Minto by a despatch dated December 2, 1902 (copy appended, marked “B”), and by a subsequent letter dated December 3, 1902 (copy appended, marked “C”).

The Canadian Government accepted the invitation of the United States Government under the recommendation of the Honourable the Minister of the Interior (copy appended, marked “D”).

On June 6, 1903, the Canadian Government was informed by the Secretary of State for the Colonies that His Majesty's Government had accepted the suggestion of the Canadian Ministers in regard to the appointment of the Canadian Commissioners (copy of Mr. Chamberlain's letter appended, marked "E").

The American members of the Commission were appointed October 2, 1903. They were Colonel O. H. Ernst, Corps of Engineers, United States Army; Mr. George Clinton, attorney-at-law, of Buffalo, N. Y.; and Professor Gardner S. Williams, of Ithaca, N. Y.

The first appointed on the Canadian section was Dr. W. F. King, Dominion Chief Astronomer, of Ottawa, on December 3, 1903 (copy of Order-in-Council appended, marked "F"). The two other Commissioners, Mr. James Pitt Mabee, K. C., of Toronto, and Mr. Louis Coste, C. E., of Ottawa, were appointed on January 7, 1905 (copy of Order-in-Council appended, marked "G"). On February 20, 1905, Mr. Thomas Côté, of the City of Montreal, was appointed secretary of the Canadian section of the Commission. He acted as secretary of the full Commission up to the appointment by the United States Government of Mr. L. C. Sabin, as secretary of the American section, on the 1st of August, 1905. On May 20, 1905, Mr. James P. Mabee was appointed President of the Canadian section of the Commission (copy of Order-in-Council appended, marked "I").

The Canadian section held its first meetings in Ottawa, Ont., on March 6 and 7, 1905. The scope of the investigations to be undertaken was defined in a letter addressed to each Commissioner by the Honourable the Secretary of State for Canada, dated January 16, 1905 (copy appended, marked "J"), from which the following is an extract:—

"Among the subjects that may come up for consideration before this Commission are:

"1. The proposed diversion southward by the Minnesota Canal and Power Company of Duluth, of certain waters in the State of Minnesota that now flow north into the Rainy River and the Lake of the Woods.

"2. The diversion about a mile and a half east of the town of Sault Ste. Marie of part of the waters of the St. Marys River into the Hay channel entirely through American territory. The river St. Marys now forms part of the boundary between the United States and Canada, and the waters of the river are clearly international. The Canadian vessels of necessity are using the Hay channel, but no treaty has been made concerning their right.

"3. Enquiry into the effect of the levels of Lakes Huron and Erie by the construction of the Chicago Drainage Canal.

"4. The building of a dam and other obstructions on the St. John River flowing through the State of Maine into New Brunswick, contrary to the express stipulation of the Ashburton Treaty."

The American section held its first meeting in Washington, D. C., on May 10, 1905, and organized by the election of Colonel Ernst as chairman. The scope of the investigations to be undertaken was defined in a letter from the Department of State, dated April 15, 1905 (copy appended, marked "K"), from which the following is an extract:—

"The wording of the law will be seen by reference to the enclosed copy. The Department's opinion is that the words 'including all of the waters of the lakes and rivers whose natural outlet is by the River St. Lawrence to the Atlantic Ocean' are intended as a limitation on what precedes them, and that the investigation and report should cover only such waters, omitting the lower St. Lawrence itself, as well as all other waters not discharging naturally through it.

"The broader interpretation given to the Act by the Canadian authorities should be rejected, if for no other reason, on account of the smallness of the

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“ appropriation for the support of the American section. Congress could hardly
“ have intended to provide, with a sum of \$20,000, for the expenses incident to
“ an investigation extending to the Pacific coast, and possibly embracing the
“ Alaskan boundary as well.”

Previous to the first meeting of the American section, it was learned that the United States Government had placed upon the Act of Congress, authorizing the appointment of the Commission, a construction limiting considerably the scope of the investigations to be undertaken.

By a despatch dated February 3, 1905 (copy appended, marked “L”), the Canadian Government, through diplomatic channels, made representations to Washington in regard to the erection of further piers in the St. John River. On February 24th the United States Secretary of State informed the Canadian Government, through His Majesty’s Ambassador in Washington, Sir H. M. Durand (copy of Sir H. M. Durand’s despatch and copy of Mr. John Hay’s letter appended, marked “M” and “N”, respectively), that the Commission was debarred from investigating the case of the St. John River and making a report thereon.

On March 25, 1905, the Canadian Government made further representations to the United States Government (copy of Order-in-Council appended, marked “O”), from which the following is an extract:—

“The Minister further observes that throughout the correspondence which
“ has taken place prior to the appointment of the Canadian section of the Com-
“ mission, the terms used have always been identical to those of the Act above
“ referred to (the River and Harbor Act approved June 13, 1902), and that it
“ has always been understood that the investigation would bear upon the con-
“ ditions and uses of the waters adjacent to the boundary line between Canada
“ and the United States, the other waters belonging to the lakes and rivers
“ whose natural outlet is by the River St. Lawrence to the Atlantic Ocean being
“ stated to be also included therein, but the general scope of the Commission
“ being especially intended to apply to all waters adjacent to the boundary line
“ between Canada and the United States.

“The Minister, therefore, is of the opinion that in the despatch under his
“ consideration an unintentional misapprehension has existed as regards the
“ terms of the Act of Congress, and that it is fit and proper that the work of the
“ Commission be not restricted to narrower limits than those indicated by the
“ said Act.

“The Minister, therefore, recommends that the necessary representations
“ be made in order that the investigation to be carried on by the said Commission,
“ and the report to be based thereon shall extend to all the waters adjacent to
“ the boundary line between Canada and the United States, and, therefore,
“ include such portions of the St. John River as will come within the limit
“ assigned by the Act of Congress to the work of the Commission.”

In the meantime, the American section at its meeting, held on May 10, had decided to invite the Canadian members to join in the first full meeting of the Commission in Washington, D. C., to be held May 25th, and an invitation was issued accordingly by the Department of State at the request of the Secretary of War. On May 25th the full Commission held its first meeting in Washington and organized by the election of Colonel Ernst as chairman of that meeting, it being agreed that at meetings of the full Commission held on American territory, the chairman of the American section should preside, and at meetings held on Canadian territory, the chairman of the Canadian section should preside. The Canadian members paid a visit of courtesy to President Roosevelt, where the scope of the investigations was informally discussed. The full Commission also proceeded in a body to call upon the Secretary of State.

The Commission remained in session during the 25th and the following day, discussing the organization, permanent places of meeting, and scope of their

duties. It was decided that for the present the offices of the Canadian section should be established in Toronto and those of the American section in Buffalo, and that full meetings should be held in one or the other city, as should be found most convenient. Subsequently, though, the Canadian section decided to establish its permanent quarters in the City of Ottawa, not having been able to find in Toronto, at any reasonable price, suitable offices.

The American section having presented the instructions under which they were acting, quoted above, the President of the Canadian section, Mr. J. P. Mabee, presented the following memorandum:—

“The Canadian members of the International Waterways Commission had understood the scope of the Commission to be wider than the American members regard it, and that misunderstanding may be avoided, desire briefly to state the position they have understood matters to be in.

“The invitation of His Majesty's Government, through the American Ambassador in London, was ‘for the appointment of an international commission, to be composed of three members from the United States and three who shall represent the Dominion of Canada, whose duty it shall be to investigate in general the waters adjacent to the boundary line between the United States and Canada, the effect upon the shores produced by changes in the water levels, and the erection and location of a dam at the outlet of Lake Erie.’

“In due course by a report of the Committee of the Privy Council of Canada, approved by the Governor-General of Canada, it was resolved ‘that His Majesty's Government accept the invitation to co-operate in the formation of the Commission,’ this report, after further reciting that as the subjects to be dealt with pertained to ‘the regulations of the waters adjacent to the international boundary,’ the matter in so far as Canada was concerned should be under the Department of the Interior and the Department of Public Works.

“Some regrettable but unavoidable delay in completing the Canadian section of the Commission arose by the long-continued illness of the Honourable the Minister of Public Works for Canada.

“In the despatch to the Government of Great Britain, naming the American Commissioners, the invitation to His Majesty's Government is again recited as being one to form an ‘international commission to investigate and report upon the conditions and uses of the waters adjacent to the boundary lines between the United States and Canada.’

“After the appointment of the Canadian Commissioners, the Prime Minister of Canada, Sir Wilfrid Laurier, in communicating the matter to the Canadian House of Commons in January last, dealt with the subject-matter of the Commission as covering all waters adjacent to the boundaries of the two countries, and in the course of his speech made the following statements: ‘In sections of the country where the boundary is not water, but land, there are streams and large rivers which have their sources in one country and which flow into another. Complaint has been made by the United States that Canadians have constructed some works upon rivers which have their sources in Canada and which flow into the United States, and that these works affect the flow of the waters in their country. We also have made complaints to the United States that Americans have constructed upon some rivers, the St. John River, for instance, works which affect the flow of the waters in our country. It is, therefore, to the mutual interest and advantage of both countries to have this question properly investigated with the view of having concurrent legislation if such should be found necessary. From olden times it has been a principle of Roman law, which has been adopted by most civilized nations, that the riparian owner of any stream has the right to use the water of that stream for his own benefit, provided he does not impair the flow of the water beyond the boundary of his property. This is a principle of law

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“ ‘which dominates in almost every country; but it is not possible to have this
“ ‘principle followed and carried out when the works are in one country and the
“ ‘boundary of the property is in another country. For these reasons we have
“ ‘thought it advisable to respond to the invitation of the United States to have
“ ‘this question investigated. We have agreed to a commission, to be composed
“ ‘of six members, three to represent the Government of the United States and
“ ‘three to represent the Government of Canada.’

“ If the inquiries of the Commission are to be limited to the waters of the
“ Great Lakes only, it would seem that the Government of Canada has been
“ under a misapprehension as to the desires and intentions of the Government
“ of the United States, and we regard it as our duty to report to our Government
“ the limitations expected to be placed upon the scope of the Commission, and
“ we respectfully suggest that further action should be delayed until we may be
“ advised of the views of the Government of Canada upon the premises.”

This was concurred in by the two other Commissioners, Dr. W. F. King and Mr. Louis Coste.

The chairman of the American section stated that he was informed that the British Government had communicated with the American Government, through diplomatic channels, requesting that a broader interpretation be given to the Act of Congress providing for the Commission, and that the American Government then had the matter under consideration, but that no decision could be taken before the return to Washington of the United States Secretary of War, at the time absent in the State of Ohio. It was then decided that further proceedings be deferred until further instructions be received from the two Governments. It was agreed that the decision of the American Government should be communicated to the chairman of the Canadian section as soon as received, and that if it be favorable to the Canadian interpretation of the law, or if it be unfavorable and be accepted by the Canadian Government, then a meeting of the Commission should be called on Canadian territory by the chairman of the Canadian section at as early a date as practicable. The result of this meeting was communicated to His Majesty's Ambassador at Washington by the secretary of the Canadian section, and Sir H. M. Durand and Mr. H. O'Beirne, the British charge d'affaires, had interviews with Secretary of War Taft and Acting Secretary of State F. B. Loomis, urging the contention of the Canadian Government as set forth in the Order-in-Council of March 25, 1905, above quoted and appended, marked “O”.

The United States Government persisted in its interpretation of the Act of Congress and His Majesty's Ambassador in Washington was so informed by the Acting Secretary of State, F. B. Loomis, in a letter dated May 31, 1905 (copy appended, marked “P”).

On June 2nd, the Acting Minister of Public Works, Honourable W. S. Fielding, was informed by the secretary of the Canadian section of what had happened in Washington (copy of the memorandum appended, marked “Q”).

On June 5, 1905, the following instructions were given to the Canadian section by the Right Honourable Sir Wilfrid Laurier:—

PRIME MINISTER'S OFFICE, CANADA.

“OTTAWA, June 5, 1905.

“DEAR SIR,—With reference to the objection raised by the American Commissioners to consider any other waters than the waters of the lakes and rivers
“ whose natural outlet is by the River St. Lawrence to the Atlantic Ocean, it
“ would be of no use to persist in our contention, and the Government, therefore,
“ are of opinion that the Commissioners had better proceed even in this limited
“ way.

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"At the same time, the Canadian Commissioners would do well to call the attention of the Commission to the condition of things which exists on the River St. John, and the necessity of prompt joint action thereon.

"Yours very sincerely,

"WILFRID LAURIER.

"THOMAS COTE, ESQ.,

"*Secretary, Canadian Section,*

"International Waterways Commission,

"Ottawa."

In the meantime, the decision of the United States Government had been communicated to the President of the Canadian section by a letter dated June 2, 1905 (copy appended, marked "R"). The chairman of the Canadian section communicated to the chairman of the American section the decision of the Canadian Government, authorizing the Canadian members to proceed with the work of the Commission within the field prescribed to the American members (see letter copy appended, marked "S").

The Canadian section then proceeded to complete its organization. Through the courtesy of the Honourable the Minister of Public Works, temporary quarters in the Seybold building, in Ottawa, were assigned to its use, and later on, excellent quarters were procured in the Corry building. The American section, on the other hand, proceeded also to complete its organization, establishing its quarters in the Federal building in Buffalo. Mr. L. C. Sabin, the secretary of that section, took charge of the office on September 11, 1905.

The full Commission held its second meeting at Toronto, June 14 and 15, 1905. It was learned then that Professor Williams had tendered his resignation as member of the Commission, and had been replaced by Mr. George Y. Wisner, C. E., of Detroit, appointed June 8, 1905. Among the questions brought to the attention of the Commission at this meeting were the following, viz.:—

"A. The uses of the waters at Sault Ste. Marie for power purposes, and the regulations necessary to insure an equitable division of the waters between the two countries and the protection of the navigation interests.

"B. The uses of the waters of the Niagara River for power purposes, and the regulations necessary to insure an equitable division of the waters between the two countries and the protection of Niagara Falls as a scenic spectacle.

"C. The alleged differences in the marine regulations of the two countries with respect to signal lights, and the advisability of adopting uniform signals for both countries.

"D. The advisability of building controlling works at the outlet of Lake Erie, including the effect upon the levels of the lakes and upon their shores, and upon the River St. Lawrence.

"E. The diversion southward by the Minnesota Canal and Power Company, of Duluth, of certain waters in the State of Minnesota that now flow north into the Rainy River and the Lake of the Woods.

"F. The effect of the Chicago Drainage Canal upon the levels of Lakes Michigan, Huron, Erie and Ontario, and upon the River St. Lawrence.

"G. Delimiting the international boundary on the international waterways and delineating the same on modern charts.

"H. The suppression or abatement of illegal fishing on the Great Lakes.

"I. The location and construction of common channels.

"J. Regulations to govern navigation in narrow channels.

"K. Protection of shores from damage due to deepening of channels and increased speed.

"L. The transmission of electric energy generated in Canada, to the United States, and vice versa."

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The questions more specially dealt with at the meetings of the Commission, on June 14th and 15th in Toronto, were the construction of regulating works at the outlet of Lake Erie, and their probable effect on Lake Ontario and on the River St. Lawrence; the uses of the waters of Niagara River for power purposes, and the preservation of the Falls; and the proposed works of the Minnesota Canal and Power Company, which were referred to the Committee on Jurisdiction, composed of the attorneys of the two sections, and also to the Engineering Committee, composed of Mr. George Y. Wisner and Mr. Louis Coste.

In view of permitting the Commission to make its existence known to the persons most interested in the international waterways, so as to receive suggestions from them, and to visit in person some or all of the principal localities concerned, it was decided to give public hearings where such hearings were desired by the local business interests.

On July 7th, the Commission in a body paid a visit of courtesy to the Canadian Government, at Ottawa, and were the recipients of many delicate attentions from the authorities. Between the 9th and 13th of July, the Commission passed over the St. Lawrence River and the Canadian Canals from Quebec to Kingston, using the Government steamer "Frontenac," kindly placed at their disposal by the Honourable the Minister of Marine and Fisheries. Public hearings were held at Montreal July 11, at Kingston July 13, at Niagara Falls September 14, at Toronto September 15, at Hamilton September 16, and at Buffalo November 10. At the first hearing in Montreal, strong objections were presented by the commercial and shipping interests against the proposed construction of controlling works at the outlet of Lake Erie, in fear that such works would be detrimental to the navigation of the St. Lawrence River, and more especially of the St. Lawrence ship channel from Montreal to Quebec. It was then emphatically stated by the American members of the Commission that no plan had yet been prepared for the proposed works, and if said works were to cause injury to the River St. Lawrence, the proposition would be entirely and absolutely rejected.

The same expression of opinion was given at the public hearings held in Kingston, Toronto, Hamilton and Niagara Falls.

During the month of August a majority of the members of the Commission visited the Detroit River, the St. Clair River, Lakes St. Clair and Huron; St. Marys River, Sault Ste. Marie; Lake Superior; Port Arthur, Fort William and their surroundings; Duluth, Minneapolis, St. Paul, Chicago and Detroit. The report of the sub-Committee who made this investigating trip is appended, marked "Z".

Meetings of the full Commission were also held at Buffalo on September 11, 12 and 13, October 27 and 28, and November 10 and 11. To enable all interested persons to appear before the Commission, or to address it, it was arranged that public notice of all meetings would be given as long in advance as possible through the press of the principal cities on both sides of the Great Lakes and the St. Lawrence River.

SAULT STE. MARIE.

Of all the questions brought to the attention of the Commission the most pressing one for consideration was that relating to the uses of water at the Sault Ste. Marie. The situation there, in brief, as described in the progress report of the American section of the Commission to the United States Secretary of War is this:—

"The volume of water flowing out of Lake Superior is, at normal low water
"—elevation 601—about 64,000 cubic feet per second. Lower stages and a
" lower discharge have sometimes occurred. On either side of the rapids is a

“ navigation canal, constructed by the United States and Canadian Governments, respectively.

“ The traffic through these canals has reached enormous proportions and is increasing. It is larger this year than ever before, and will greatly exceed 40,000,000 tons for the year. The quantity of water consumed in the operation is about 1,200 cubic feet per second. The quantity required in the future will be greater. Not less than 4,000 cubic feet should be unconditionally reserved for canal uses, and in granting power privileges, the respective Governments should not forfeit the right to increase the amount indefinitely. It may be remarked in passing that raft navigation over the rapids has so greatly diminished, and is now so small in amount, that the quantities of water above mentioned will suffice to provide for it. This leaves about 60,000 cubic feet which may be temporarily used for power purposes.

“ On the Canadian side the Lake Superior Power Company has a power canal in operation, which has a capacity of about 9,000, and is using about 7,000 cubic feet per second. This Company has designed an additional canal, not yet constructed, which will have a capacity of about 23,000 cubic feet per second. On the American side the Michigan Lake Superior Power Company has in operation a power canal, which has a capacity of about 31,000, and is using about 3,500 cubic feet per second. This canal takes the water from the St. Marys River above the rapids, conducts it through the City of Sault Ste. Marie, and empties it about a mile below the rapids. On the American side also the Chandler-Dunbar Company, owning a portion of the shore line adjoining the rapids, have in operation power works using about 1,400 cubic feet per second. This Company is engaged in altering and improving its works in the bed of the stream, under revocable permits from the Department.

“ Under permits thus far granted, the consumption of water will be increased to about 3,000 cubic feet per second, but in March, 1902, the Company applied for a permit to build a dike downstream from the fourth pier, counting from the American side of the International Bridge in a direction nearly parallel with the shore, to connect with a power house extending out an equal distance into the stream. A rival company, the St. Marys Power Company, applied in March, 1903, for permission to construct a power canal by means of two parallel dikes extending downstream and a short distance upstream, from the third and fifth piers of the bridge, with corresponding power house. Neither of these latter requests were granted, but they show what the intentions of the Companies are, if they be permitted to carry them out. Evidently there is not enough water to carry out all of these schemes. An understanding must be reached by which there shall be an equitable division of the surplus water between the two sides of the boundary. The division between rival companies, fortunately for this Commission, may be left to the courts of law.

The figures above quoted for the Chandler-Dunbar Power Company represent 700 cubic feet per second being actually used, and 700 cubic feet per second being wasted.

The application to the War Department of the United States from the American companies for further privileges, and from the Lake Superior Power Company to the Canadian Government for additional authority, led the Commission at its session of October 28 to pass the following resolution, of which copies were sent to the Secretary of War of the United States and the Minister of Public Works for Canada, viz.:—

“ RESOLVED—That in the opinion of this Commission, no further rights or privileges should be granted or conferred regarding the uses or diversions of the water flowing out of Lake Superior, by either the Government of the United States or Canada, until all data and information are in the hands of the Commission that may be necessary to enable it to make suggestions for regu-

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“ lating the excess of these waters, or that, if such rights or privileges be granted,
“ they be subject to any regulation that may be adopted by both Governments.”

This resolution was transmitted to the Lieutenant-Governor of Ontario by the Secretary of State for Canada, upon a report of the Privy Council (copy appended, marked “T”).

The use of water in St. Marys River for power purposes must be so regulated as not to affect injuriously the level of Lake Superior. The level must never be allowed to fall so low as to injure navigation, and it must never be raised so high as to submerge the shores.

The Act of Congress, approved on June 13, 1902, authorized the Michigan Lake Superior Power Company to divert water from St. Marys River, above the rapids, with certain conditions, which are described as follows in the Act, viz.:—

“ Subject to the express precedent conditions hereinafter mentioned, the
“ Michigan Lake Superior Power Company, of Sault Ste. Marie, Michigan, its
“ successors and assigns, after first obtaining consent of the Secretary of War
“ and the Chief of Engineers and their approval of the said canal and remedial
“ works proposed, is hereby authorized to divert water from the Saint Marys
“ River into its water-power canal, now being constructed at Sault Ste. Marie,
“ Michigan, for water-power purposes while and so long as such works and diver-
“ sion of water from said river shall not injuriously affect navigation therein,
“ nor impair or diminish the water levels or any natural increase thereof either
“ in Lake Superior or in the United States ship canal and locks or the navigable
“ channels, locks or ship canals connected therewith, whether natural or artificial,
“ now existing or which may hereafter be established or created by the United
“ States for navigation purposes. And conditioned further, that said Company
“ shall establish, maintain and operate suitable and sufficient remedial and
“ controlling works in the rapids of said river, to the approval of the Secretary
“ of War and the Chief of Engineers; and said Company shall maintain and
“ operate said canal and works in accordance with any rules and regulations
“ that may hereafter be recommended by any International Commission and
“ that shall become operative. Whenever, in the judgment of the Secretary of
“ War, the operation of said canal and remedial and controlling works, or either
“ of them, either in themselves or in conjunction with any other canal or canals
“ in the United States or Canada which now or hereafter may exist, is injuriously
“ affecting water levels or the navigation of Lake Superior, the River Saint
“ Marys or other channels, locks or ship canals connected therewith as herein-
“ before provided, he shall impose upon said Company such rules and regulations
“ for the operation of said canal and remedial works, as may, in his opinion, be
“ necessary to prevent such injury. It shall become his duty, and he shall have
“ the authority to enter upon the property of said Company and to close said
“ canal in whole or in part to the extent necessary to maintain water levels and
“ to require said Company, at its own expense, to remove, add to or modify said
“ works or any part thereof to the extent necessary to maintain water levels.
“ Neither the Secretary of War nor the Chief of Engineers or any officer or other
“ person acting under direction of them or either of them, shall be in any way
“ liable by reason of anything done in the execution of this provision.

“ All remedies herein provided, however, shall be cumulative, and shall be
“ without prejudice to any other remedies, either of the United States or of
“ individuals, for failure of said Company to maintain said levels for navigation
“ purposes as herein provided.

“ Nothing herein contained shall be held to affect any existing riparian or
“ other rights of any person or corporation, or the existing remedies therefor, or
“ any action at law or equity now pending. The right is hereby expressly
“ reserved to Congress to alter, amend or repeal the provisions contained in this
“ paragraph.”

The United States War Department entered into an agreement with the

Michigan Lake Superior Power Company (copy of which is appended, marked "U"), and imposed upon the Company certain rules and regulations to govern the maintenance of the level of Lake Superior. In the legislation above quoted and in the agreement referred to, the principle was recognized that the use of the water of St. Marys River for power purposes was not granted in any fixed quantity nor for any fixed length of time. It was further recognized that the Secretary of War could enter upon the property and close the canal of the Company, in whole or in part, at any time to the extent necessary to maintain the level of St. Marys River above the rapids. The Act further stated that the use of the water of St. Marys River should finally be regulated by an international commission. The rules and regulations imposed upon the Michigan Lake Superior Power Company by the Secretary of War on December 2, 1902, are still in force, and will probably be used by the International Waterways Commission as a foundation in framing the regulations to be ultimately recommended to the Government of Canada and to the Government of the United States. The fundamental principles on which these rules and regulations are based are:—

1. Levels must be maintained.
2. Navigation must be protected.
3. The public must reserve the right to use any portion or all of the natural flow in the future.

A public hearing, at which the parties interested in the condition of affairs at Sault Ste. Marie were given an opportunity to be heard, was held in Buffalo on November 10. The Lake Carriers' Association appeared before the Commission and made a strong plea in favor of reserving the land north of the Poe lock for the construction of an additional ship canal and locks.

The Commission, at its session of November 11, practically adopted certain rules and regulations to govern the use of the water at St. Mary's River and the maintenance of the level of that river above the rapids, and it is hoped that said rules and regulations can be forwarded to the United States Secretary of War, and to the Minister of Public Works of Canada, for approval at an early date. The enforcement of these rules and regulations calls for executive action from time to time, and in this regard the American section of the Commission, in its progress report to the Secretary of War, suggested that said executive action be vested in an international commission. Here follows the suggestion of the American section:—

"The enforcement of these rules and regulations calls for the executive action from time to time of an international commission. The enforcement of rules to be established hereafter at other places or upon other subjects will probably likewise require joint executive action. It is not clear from the language of the law creating this Commission that Congress intended to provide for a permanent international board. It is desirable that the status of the present Commission as a permanent executive board be defined, or a new board created."

The questions brought to the attention of the Commission enumerated above cover a wide range of subjects. Some of them clearly come under the jurisdiction of the Commission as constituted and as limited in its scope by the United States Government. Some do not, if the opinion of the United States Attorney-General is to prevail, come under the jurisdiction of the Commission, whilst about others there is room for doubt. The American section, in the progress report made to the United States War Department (copy appended, marked "A 1"), has suggested that the jurisdiction of the Commission be more clearly defined.

The United States Secretary of War, in his annual report to President Roosevelt, dated December 9, 1905, has approved the suggestions of the American section in this regard. Here is what he states at pages 51 and 52 of said report:—

"The full Commission has held numerous meetings and public hearings, in

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“ both the United States and Canada, and has collected a large amount of data
“ bearing upon the various questions which have been brought to its attention.
“ A progress report, showing the work that has been accomplished; is attached
“ hereto, marked Appendix F, and attention is invited to this report for a full
“ and detailed statement of the labors of the Commission.

“ It has been hampered in its work by a lack of clear understanding as to
“ its permanency and as to the eventual scope of its duties. For example, in
“ making regulations for the uses of the surplus waters at the Sault Ste. Marie
“ for power purposes, it seems necessary to provide for joint continuous super-
“ vision. The enforcement of rules to be established hereafter at other places
“ or upon other subjects will probably likewise require joint executive action.
“ It is not clear from the language of the law creating the Commission that
“ Congress intended to provide for a permanent international board. It is
“ desirable that the status of the present Commission as a permanent executive
“ board be defined or a new board created.

“ The questions which have been brought to the notice of the Commission
“ by various persons or interests thus far cover a wide range of subjects. Some
“ of these questions clearly come under the jurisdiction of the Commission as
“ constituted, while some clearly do not, and about others there is room for
“ doubt. The Canadian members of the Commission are ready and anxious to
“ consider all of these questions and to extend the jurisdiction of the Commission
“ to all international waters between the Atlantic and the Pacific Oceans. It is
“ desirable that the wishes of Congress in this matter be more defined.”

Since the Commission completed its organization, it has made good progress in the collection of data bearing upon some of the questions brought before them, particularly upon those relating to the uses of the waters of the Niagara River for power purposes: the regulation of the level of Lake Erie by works near its outlet, and the proposed works of the Minnesota Canal and Power Company.

NIAGARA FALLS.

With reference to the uses of the waters at Niagara Falls, although the Commission was not ready to report, it thought proper to pass, at its session of October 28, the following resolution, of which copies were sent to the Secretary of War of the United States and to the Minister of Public Works of Canada, viz.:—

“ RESOLVED—That this Commission recommend to the Government of
“ the United States and Canada that such steps, as they may regard as necessary,
“ be taken to prevent any corporate rights and franchises being granted or
“ renewed by either Federal, States or Provincial authority for the uses of the
“ waters of the Niagara River for power or other purposes until this Commission
“ is able to collect information necessary to enable it to report fully upon the
“ ‘condition and uses’ of those waters to the respective Governments of the
“ United States and Canada.”

This resolution was transmitted by the Secretary of State for Canada to His Honour the Lieutenant-Governor of Ontario, and by the United States Secretary of War to the Governor of the State of New York.

The Canadian section requested Monseignor J. C. K. Leflamme, the eminent Professor of Geology at Laval University, Quebec, to make a special report on the geological condition of the bed of the river in the vicinity of the Falls. His report is appended, marked “V”.

The situation at Niagara in brief is this:—

The following quantities of water are required for chartered developments in operation or in course of construction on both sides of the river:—

On the Canadian Side—

The Ontario Power Company	12,000	cubic feet per second.
The Electrical Development Company	10,600	" " " "
The Canadian Niagara Power Company	9,500	" " " "

Total 32,100

On the American Side—

The American Niagara Falls Power Com- pany	17,200	cubic feet per second.
The Niagara Falls Hydraulic Power and Manufacturing Company	9,200	" " " "

Total 26,400

Total on both sides, 58,500 cubic feet per second.

It is estimated that the total flow over the two Falls is 222,400 cubic feet per second. There remains to be determined to what extent the use of 58,500 cubic feet per second for power purposes by the present companies, on both sides of the river, will affect the American Fall. A competent hydraulic engineer, at the request of Dr. Clarke, the geologist of the State of New York, has calculated that the subtraction of 40,000 cubic feet per second from the Niagara River above Goat Island will draw the water down to the rock bottom edge of the American Fall, leaving a miserable little film dribbling over the sill; and that the subtraction of 40,000 cubic feet more, or 80,000 cubic feet per second in all above Goat Island, will dry up the American channel completely, while the Canadian channel will still be an object of interest. Does this necessarily mean that the using of more water on the Canadian side, assuming that said water is taken below the crest of the rapids, will also affect the American Fall? This is a point to be determined.

According to the Niagara Falls Electrical hand book, the height of the Canadian Fall, over which flows about seven-eighths of the entire volume of water, is 159 feet. The height of the American Fall is 165 feet, or about six feet greater than that of the Horseshoe Fall, the difference in the level being caused by the greater declivity in the bed of the river in the Canadian channel.

The official geologist of the State of New York states that the height of the American Fall is by ten feet greater than the Horseshoe Fall. Other engineers and experts have put the difference to from twelve to fourteen feet. This point should also be determined.

The slope of the Niagara River towards the Horseshoe Fall is such that the level in the vicinity of the intakes of the power plants on the American side is considerably higher than the Horseshoe Fall, towards which the water flows down as in a steep recipient. The American Fall is barred off on this channel by a reef near the head of Goat Island. The form of the Niagara River is such, however, that it spills over the side of the draw leaving to the Horseshoe Fall and branches the water which flows over the American Fall. It is clear that the drawing of water from the American side must have a greater effect upon the lower end of the American Fall than drawing it on the Canadian side, two of the Canadian intakes being below the crest of the rapids. The data are lacking regarding the speed of this descent, hence it is not possible to estimate with any accuracy what are the relative amounts of water which can be drawn from the two sides of the river without affecting the American Fall. *En resume*, we have no absolute data to govern us at the present time.

Besides the chartered developments referred to above, there are in existence two charters granted by the New York Legislature to corporations organized to take unlimited water from Niagara River.

The Dominion Parliament has also granted charters to three corporations which are still in force and organized for the purpose of diverting water from

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the Welland River or from the Niagara River by back flow, and from Grand River and Lake Erie.

None of these Companies on either side of the river have actually commenced the construction of their works.

At Chicago, citizens of the United States have built a drainage canal, which, when fully completed, will use 10,000 cubic feet of water per second. This drainage canal will have the effect of lowering Lake Michigan by over six inches, and Lake Erie by nearly four inches. It will, beyond a doubt, materially affect the flow of the Niagara River over the Falls.

On the Canadian side there is also the Welland Canal and The Hamilton Cataract Power Company who take their water from the Welland Canal, using the escarpment at De Cew's Falls and representing a total diversion of 2,400 cubic feet per second.

There is also the Niagara Falls Park River Railway Co., who are using 1,500 cubic feet of water per second.

On the American side another diversion of 1,500 cubic feet per second is made by way of the Erie Canal.

Therefore the total diversions of water by works in operation or under actual construction on the American side represent 37,900 cubic feet per second, and on the Canadian side, the total quantity of water which will be ultimately diverted by works actually in operation or in way of construction represent 36,000 cubic feet per second.

President Roosevelt, in his message to Congress on December 5, 1905, stated as follows:—

“In my judgment, the Grand Canyon of the Colorado should be made into
“ a national park. It is greatly to be wished that the State of New York should
“ copy, as regards Niagara, what the State of California has done as regards
“ the Yosemite. Nothing should be allowed to interfere with the preservation
“ of Niagara Falls in all their beauty and majesty. If the State cannot see to
“ this, then it is earnestly to be wished that she should be willing to turn it
“ over to the National Government, which should in such case (if possible, in
“ conjunction with the Canadian Government) assume the burden and responsi-
“ bility of preserving unharmed Niagara Falls; just as it should gladly assume
“ a similar burden and responsibility for the Yosemite National Park, and as it
“ has already assumed them for the Yellowstone National Park. Adequate
“ provision should be made by Congress for the proper care and supervision of
“ all these national parks.”

Your Commission are desirous of obtaining the views of the Government as to preserving the scenic beauty of Niagara Falls.

No doubt the Government of the Province of Ontario will be ready to co-operate with the Dominion Government in this regard. An agreement will have to be arranged whereby the quantity of water diverted for power or other purposes shall be limited, and there will have to be an arrangement for equitable division of such waters. The demand for use of power for commercial purposes will increase every year, and it will require a very strong stand to prevent the despoiling of this one of Nature's greatest wonders.

The Federal Government has, in the opinion of this Commission, control of the deportation of power to the United States. Unfortunately, a very large portion of the power generated on our side of the River at Niagara will, unless some more effectual restrictions are placed upon its removal, soon be permanently diverted to the building up of American factories and the running of American railways. Within a few years our own railways will be clamoring for this power. Vested rights already interfere with action in this regard, and the more power that is now allowed to be diverted the greater will be the evil and the harder to rectify.

It is quite evident, in the view of the Commission, that the jurisdiction to deal with international waters must be vested in the Federal Government of each country. Changed conditions and the greatly increased demand for power, owing to electrical developments, have rendered it absolutely essential that there should be one authoritative body controlling the diversion of such waters. The interests of navigation must be paramount, and the Federal Government alone must ultimately decide what those interests are. The maintenance of Niagara is a national matter and should be dealt with on national lines.

The whole question of riparian rights in relation to navigable streams or international waters will most likely have to be adjusted by some treaty arrangement between the two countries, and instructions will have to be given to some Commission to report upon some scheme of settlement upon broad lines.

It is desirable to have settled, by the highest authority, as soon as possible, whether the water in navigable international streams is in any sense the property of the Provinces or States bounding on the same, or whether whatever property rights exist in such streams are vested in the Federal Government. If it should be held that the Provincial and State authorities have proprietary rights in such waters, then your Commission are of the opinion that some arrangements should be made with the Provinces by which such rights should be acquired, so that the use of the same may be the subject of a reasonable treaty of mutual benefit with our neighbors.

RAINY RIVER.

The proposed works of the Minnesota Canal and Power Company are of vast importance to the Rainy River District. They may be described as follows:—

At the height of land in St. Louis and Lake counties in Northern Minnesota, the waters from Birch Lake and White Iron Lake, and the streams running out thereof, and the immense watershed thereof, run northward and ultimately into Rainy Lake, and from there into Rainy River, passing into the Lake of the Woods. The water from this source forms by computation seven per cent. of the water passing out of Rainy Lake over Alberton Falls at Koochiching. The water system of Rainy River and Lake of the Woods have long been established as a commercial highway. From the Canadian ports of Rat Portage and Fort Francis, two large and well equipped passenger and freight lines ply daily during the season of navigation, forming the means of water communication between the Canadian ports of Rat Portage, Rainy River town, Boucherville, Burwick, Emo, Big Forks, Little Forks, Isherwood, Fort Francis, Bears Pass, Seine River and Mine Centre, and forming along a considerable part of such route the only vehicle of passenger and freight communication.

The most important section of the two hundred miles of navigation is the Rainy River, flowing through what is rapidly becoming a thickly populated and prosperous valley for some eighty odd miles, with towns rapidly building up at close intervals on its banks dependent almost wholly on the river route for their mercantile and manufacturing interests. The fine class of steamboats plying on this water is already in certain portions of the summer hampered by low water on the rapids and shoals of the river, and the proprietors of the regular steamboat lines have been earnestly petitioning for such improvement being made on the river as would remove such disability, a disability that compels the withdrawal for considerable intervals during each summer of some of the large and deeper draught steamboats. In view of the fact that navigation is already suffering for lack of adequate water in portions of Rainy River and in portions of Rainy Lake, the population of that district has learned with surprise and alarm that active steps had been taken by the Minnesota Canal and Power Company, of Duluth, Minn., to obtain the authorization of

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the Federal Government of the United States, through the Commissioner of the General Land Office at Washington, to construct a dam or dams and a canal to divert all the waters of the Birch Lake and White Iron Lake watershed, hereinbefore referred to, into the Embarrass River, and by it into Lake Superior at Duluth, thus diverting from this long established international waterway of Rainy Lake and Rainy River a large proportion of its tributary waters. It is claimed that, if permission be given by the Federal Government of the United States to the project of the Minnesota Canal and Power Company, a disastrous injustice will be done to Canadian and American established navigation companies that are now using the water highway of Rainy Lake and Rainy River, and to the manufacturing towns along the river, both on the Canadian and United States sides.

It is claimed that the waters of Birch Lake and Birch River and White Iron Lake help to form the chain of lakes and rivers along the boundary which are referred to in the Webster-Ashburton Treaty, and which, by the terms of that Treaty, are a public highway, free to the citizens and subjects of both countries. The scheme of the Minnesota Canal and Power Company is to take 600 cubic feet per second out of a total estimated average flow of 985 cubic feet per second. The minimum flow is estimated at 210 cubic feet per second. The quantity to be taken, 600 cubic feet per second, would be more than the natural flow during the greater part of the year.

The Corporation of the town of Fort Francis, on March 17, 1904, sent to the Minister of Marine and Fisheries of Canada, a protest against the proposed undertaking of the Minnesota Canal and Power Company. This protest has been sent by the Canadian Government to the United States Government, through the British Embassy at Washington.

On January 25, 1905, the Acting Secretary of State, F. B. Loomis, informed the Right Honourable Sir H. M. Durand, the British Ambassador in Washington (copy of his letter appended, marked "W"), that the United States Secretary of the Interior had directed the Commissioner of the General Land Office, before whom the application of the Minnesota Canal and Power Company was pending, to suspend further action in the case until advised as to the results of the inquiry which was to be made by the International Water Boundary Commission. Later on, the Attorney-General of the United States, called upon to give his opinion on the construction to be put upon the Act of Congress authorizing the appointment of the Commission, stated in reference to the case of the St. John River, New Brunswick, that the jurisdiction of the Commission was limited to the system of the Great Lakes and the St. Lawrence River. The members of the American section have since then felt reluctant in dealing with the question of the proposed works of the Minnesota Canal and Power Company, and they are awaiting further instructions from Congress in regard to this matter.

Since the Minnesota Canal and Power Company made this application to the United States Secretary of the Interior, the Rainy River Development Company and the Ontario and Minnesota Power Company have constructed extensive works at Koochiching Falls for the purpose of improving navigation in Rainy Lake and Rainy River, with the expectation of using the power which will be developed for manufacturing purposes. The Ontario and Minnesota Power Company, under a contract with the Ontario Government, has acquired the Canadian end of the Koochiching Falls, and a number of acres of shore land adjacent. They have obtained during the last session of Parliament an Act of Incorporation, being ch. 139 and entitled, "An Act respecting the Ontario and Minnesota Power Company."

By an Order-in-Council, approved by the Governor-General on September 19, 1905, the Minister of Public Works and the Government of Canada have approved the plans of the Ontario and Minnesota Power Company (copy of the approval appended, marked "X"). The engineers of the Department of Public

Works stated that in so far as the construction of the dam at Koochiching Falls is concerned, it will not in any way interfere with navigation above or below the Falls at Fort Francis, but will, in fact, be an improvement. The dangerous rapids, two miles above Fort Francis, will be flooded, thereby improving materially the navigation. The freshet waters stored in Rainy Lake could be let out during the season of low water, thereby also considerably improving navigation of the river between Fort Francis and the Lake of the Woods. The only objection that could be raised to the proposed elevation of the dam is provided for by a proposed revetment wall to be constructed by the Company, and also by a clause in the Act of Incorporation of the Company, which makes all damages to lands caused by their works a charge to be borne by them.

The proposed works of the Minnesota Canal and Power Company would interfere with the works authorized by His Excellency the Governor-in-Council. It is expected that soon after the present session of Congress, the International Waterways Commission will take up this question.

On November 21, 1905, the chairman of the Canadian section, Mr. J. P. Mabey, having been appointed one of the Justices of the High Court of Ontario, resigned, and Mr. George C. Gibbons, K. C., of London, Ont., was appointed in his place chairman of the Canadian section (copy of Order-in-Council appended, marked "Y"). Since Mr. Gibbons' appointment there have been two meetings of the Canadian section, one in Toronto and one in Ottawa, at which the work of the Commission has been fully reviewed and the various matters before the Commission discussed.

The Canadian section, in conclusion, desire to express their appreciation of the spirit of fairness shown by the members of the United States section in the discussion of all matters.

(Signed) GEO. C. GIBBONS,
Chairman of Canadian Section.

(Signed) W. F. KING,

(Signed) LOUIS COSTE,
Members of Canadian Section.

(Signed) THOMAS COTÉ,
Secretary of Canadian Section.

HONOURABLE C. S. HYMAN
Minister of Public Works
Ottawa, Ont.

APPENDIX "A".

MR. CHOATE TO THE MARQUIS OF LANSDOWNE:

AMERICAN AMBASSY,
LONDON, July 15, 1902.

MY LORD,—Under instructions from my Government, I have the honour to enclose herewith four copies of a print of the Act of Congress, approved 13th June, 1902, making appropriations for the improvement of rivers and harbours, and at the same time to draw your Lordship's attention to section 4, page 47, of the same, which provides for the appointment of an International Commission, to be composed of three members from the United States and three who shall represent the Dominion of Canada, whose duty it shall be to investigate in general the waters adjacent to the boundary line between the United States and Canada, the effect upon the shores produced by changes in the water levels, and the erection and location of a dam at the outlet of Lake Erie. In bringing the matter to the attention of Your Lordship, I am instructed to invite His Majesty's Government to take part in the formation of the Commission in question, and I should be much obliged if Your Lordship would be so good as to cause me to be informed at the earliest moment which may be practicable, whether His Majesty's Government would be disposed to accept the invitation of my Government in this connection.

I have, etc.,

JOSEPH H. CHOATE.

APPENDIX "B".

FROM COLONIAL OFFICE TO LORD MINTO:

LONDON, December 2, 1902.

Section 4 of Act of Congress of United States of America, approved 13th June this year, for improvement of rivers and harbors, provides for appointment of International Commission of six members, three from Canada, to investigate generally waters adjacent to international boundary, United States invite His Majesty's Government to co-operate in formation of Commission. What are views of your Ministers? Telegraph reply. Papers were sent to Prime Minister 30th July.

(Signed)

Secretary of State for the Colonies.

APPENDIX "C".

SECRETARY OF STATE FOR THE COLONIES TO THE EARL OF MINTO:

DOWNING STREET, December 3, 1902.

MY LORD,—I have the honour to transmit to your Excellency, to be laid before your Ministers, the accompanying copy of a note from the American

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Ambassador at this Court, respecting a proposed international Commission to investigate the waters adjacent to the boundary line between the United States and Canada.

I shall be glad to receive any observations which your Ministers have to offer at an early date.

A copy of this letter was communicated to Sir W. Laurier on the 30th July last, but no answer has yet been received from him.

I have, etc.,

(Signed) ONSLOW,

For the Secretary of State.

APPENDIX "D".

Extract from a Report of the Committee of the Honourable the Privy Council, approved by the Governor-General on April 27, 1903.

The Committee of the Privy Council have had under consideration a Colonial Office despatch, dated December 3, 1902, transmitting an abstract of Section 4, of Act of Congress of the United States, approved June 13, 1902, which provides for the appointment of an international Commission of six members, three representing the interests of Canada, and three from the United States, to investigate and report upon the conditions and uses of the waters adjacent to the boundary lines between the United States and Canada.

The Minister of the Interior, to whom the matter was referred, submits the following recommendations: That His Majesty's Government accept the invitation to co-operate in the formation of the Commission; and that, as the subjects to be dealt with pertain to the regulations of waters adjacent to the international boundary, thereby affecting harbors and navigation, all surveys and investigations necessary to carry out the intent of the Commission, be made, as far as Canada is concerned, under the Department of the Interior and the Department of Public Works; and also, that the appointment of the three members of the Commission representing the interests of Canada be made on the recommendation of the Minister of the Interior and the Minister of Public Works.

The Committee advise that the Governor-General be moved to forward a copy of this Minute to the Right Honourable the Secretary of State for the Colonies.

All which is respectfully submitted for approval.

(Signed) JOHN J. MCGEE,
Clerk of the Privy Council.

APPENDIX "E".

DOWNING STREET, June 6, 1903.

MY LORD,—I have the honour to acquaint Your Excellency for the information of your Ministers, that, in accordance with the terms of your despatch, No. 167, of the 4th May, the Secretary of State for Foreign Affairs has informed the United States charge d'affaires that His Majesty's Government accept the

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invitation of the United States Government to co-operate in the formation of the Commission to investigate the waters adjacent to the boundary line between the United States and Canada.

His Majesty's Government accept the suggestion of your Ministers as to the appointment of the Commissioners, and I presume that steps will now be taken to carry their recommendations into effect and to select the three British representatives.

I have, etc.,

(Signed) J. CHAMBERLAIN.

APPENDIX "F".

Extract from a Report of the Committee of the Honourable the Privy Council, approved by His Excellency the Governor-General, on December 3, 1903.

The Committee of the Privy Council have had under consideration a cablegram, dated October 16, 1903, from the Right Honourable the Secretary of State for the Colonies, transmitting the names of the three gentlemen appointed by the President of the United States as members of the proposed International Waterways Commission.

The Minister of the Interior, to whom the said despatch was referred, recommends that Mr. William Frederick King, Chief Astronomer of the Department of the Interior, be appointed as one of the Canadian members of such Commission.

The Committee advise that the Governor-General be moved to so inform the Right Honourable the Secretary of State for the Colonies.

All which is respectfully submitted for approval.

(Signed) JOHN J. McGEE,
Clerk of the Privy Council.

APPENDIX "G".

Extract from a Report of the Committee of the Honourable the Privy Council, approved by His Excellency the Governor-General, January 7, 1905.

The Committee of the Privy Council have had under consideration a despatch, herewith, from the Right Honourable the Secretary of State for the Colonies, numbered 306 and dated October 28, 1904, relating to the proposed International Commission to investigate and report upon the conditions and uses of the waters adjacent to the boundary line between the United States and Canada, and inviting the Government of Canada to take the question of the appointment of the additional Canadian representatives into early consideration.

The Minister of the Interior, to whom the said despatch was referred, states that by an Act of Congress of the United States, passed in 1902, provision was made for the appointment of three persons to investigate the conditions and uses of the waters tributary to the River St. Lawrence, these persons to be one officer of the Corps of Engineers of the United States Army, one Civil Engineer well versed in the hydraulics of the Great Lakes, and one lawyer of experience in questions of international and riparian law.

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The Minister also states that provision was further made for an invitation to the Government of Great Britain to appoint an equal number of Commissioners who should represent the interests of the Dominion of Canada.

The invitation having been extended, the formal assent of the Government of Canada was given by Minute ——— of Council, dated April 27, 1904, in which it was provided that the representatives of Canada should be named by the Minister of the Interior and the Minister of Public Works.

The Minister further states that at a later date the President of the United States named his three Commissioners, and Mr. W. F. King, of the Department of the Interior was appointed by Order-in-Council on the recommendation of the Minister of the Interior.

The Committee recommend that James Mabee, Esquire, K. C., of Toronto, and Louis Coste, Esquire, Engineer, of Ottawa, be appointed Commissioners in conjunction with Mr. King on the proposed International Commission.

The Committee advise that the Governor-General be moved to forward a copy of this Minute to the Right Honourable the Secretary of State for the Colonies.

All of which is respectfully submitted for approval.

(Signed) JOHN J. MCGEE,
Clerk of the Privy Council.

APPENDIX "I".

Extract from a Report of the Committee of the Honourable the Privy Council, approved by the Governor-General on May 20, 1905.

The Committee of the Privy Council, on the recommendation of the President of the Privy Council, advise that James P. Mabee, Esquire, K. C., of Toronto, be appointed Chairman of the Canadian Commissioners to investigate the conditions and uses of the waters tributary to the River St. Lawrence, adjacent to the boundary lines between the United States and the Dominion.

(Signed) JOHN J. MCGEE,
Clerk of the Privy Council.

APPENDIX "J".

OTTAWA, January 6, 1905.

SIR,—I have the honour to inform you that by a Minute of the Privy Council, dated January 7, 1905, His Excellency the Governor-General has been pleased to appoint Messrs. J. P. Mabee, K. C., of Toronto, and Louis Coste, C. E., of Ottawa, additional members of the International Commission to investigate and report upon the conditions and uses of the waters adjacent to the boundary line between the United States and Canada, to which you were appointed on December 3, 1903.

I inclose a copy of the Minute of Council appointing these gentlemen, and

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also an extract from the American Statutes authorizing the appointment of the United States members of the Commission.

Among the subjects that may come up for consideration before this Commission are:

1. The proposed diversion southward by the Minnesota Canal and Power Company of Duluth, of certain waters in the State of Minnesota, that now flow north into the Rainy River and the Lake of the Woods.

2. The diversion about a mile and a half east of the town of Sault Ste. Marie of part of the waters of the St. Marys River into the Hay Canal entirely through American territory. The river St. Marys now forms part of the boundary between the United States and Canada, and the waters of the river are clearly international. The Canadian vessels of necessity are using the Hay Canal, but no treaty has been made concerning their right.

3. Enquiry into the effect of the levels of Lakes Huron and Erie by the construction of the Chicago Canal.

4. The building of the dam and other obstructions on the St. John River, flowing through the State of Maine into New Brunswick, contrary to the express stipulation of the Ashburton Treaty.

The Government are of the opinion that the Canadian members of the Commission should come together at an early date, and I have so informed Messrs. Mabey and Coste, and asked them to confer with you as to the date of meeting.

It is proposed to appoint Mr. Thomas Côté, Journalist, of Montreal, as Secretary to the Canadian section of the Commission.

I have the honour to be, sir, your obedient servant,

(Signed) R. W. SCOTT,

Secretary of State.

W. F. KING, Esq.,

Chief Astronomer,

Department of the Interior, Ottawa.

APPENDIX "K."

DEPARTMENT OF STATE,

WASHINGTON, April 15, 1905.

SIR,—Referring to your letter of the 10th ultimo, asking as to the instructions which may be required by the American Commissioners appointed under Section 4 of the River and Harbour Act of 1902 (32Sta. L., 373), especially in regard to a question which you state is likely to arise concerning the scope of the Commission's investigation, the Canadian members appearing to be disposed to regard it as taking in all waters adjacent to the boundary line, whether part of the Great Lakes or not, I have to state as follows:—

The wording of the law will be seen by reference to the inclosed copy. The Department's opinion is that the words "including all of the waters of the lakes " and rivers whose natural outlet is by the River St. Lawrence to the Atlantic " Ocean," are intended as a limitation on what precedes them, and that the investigation and report should cover only such waters, omitting the lower St. Lawrence itself as well as all other waters not discharging naturally through it.

The broader interpretation given to the Act by the Canadian authorities should be rejected, if for no other reason on account of the smallness of the appropriation for the support of the American section. Congress could hardly

have intended to provide with a sum of \$20,000 for the expenses incident to an investigation extending to the Pacific coast, and possibly embracing the Alaskan boundary as well.

A portion of the report of the Chairman of the River and Harbor Committee, when reporting the bill (copy of Act herewith), treats of Section 4, and would appear to limit the scope of the investigation to the Great Lakes system.

When the ground to be covered has been defined, the law itself appears to be sufficiently detailed to serve as instructions to the American Commissioners.

It seems sufficient, therefore, at the present stage to inform you and the other members of the American section of the views held by the Department as to the scope of the investigation and report, and to request the American Commissioners to assemble and organize as soon as possible after the 20th instant, at this capital, and to submit, after discussion, their own recommendations as to further procedure.

I enclose, also, for your information, copies of letters from Colonel Ernst and Professor Williams in regard to the place of meeting of the Commission.

Copies of your letter of the 10th ultimo, and of this, the Department's reply, have been addressed to Colonel Ernst and Professor Williams for their guidance.

I am, sir, your obedient servant,

(Signed) F. B. LOOMIS,

Acting Secretary.

GEO. CLINTON, Esq.,

Commissioner of the United States,

International Waterways Commission,

1012 Prudential Building, Buffalo, N. Y.

APPENDIX "L."

TO HIS EXCELLENCY THE GOVERNOR-GENERAL:

The undersigned has the honour to represent that on the 4th May last, he submitted to Your Excellency's predecessor a Minute of the Executive Council of New Brunswick, calling attention to the erection by the St. John Lumber Company—a United States incorporation—of certain piers and booms in the St. John River, near the village of Van Buren, in the State of Maine, and advised that the attention of the Government of the United States be drawn to the subject, with a view to the removal of the obstruction complained of, the erection of which it was pointed out constitutes a violation of Article III. of what is commonly known as the Ashburton Treaty of 1842; providing that the navigation of the St. John River shall be free and open to both parties and shall in no way be obstructed by either. No answer appears to have been received to this communication.

The undersigned has now the honour to submit to Your Excellency a petition signed by Mr. J. Fraser Gregory, on behalf of certain lumbermen and mill-owners of St. John in convention, pointing out that not only has no action been taken on the petition of the Provincial Government of New Brunswick, but a bill is actually before the Legislature of the State of Maine having for its object the incorporation of another company with powers to construct further piers in the said river almost immediately below those built by the St. John Lumber Company, which formed the subject of the previous remonstrance. Messrs. Gregory

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and his associates point out that if the proposed fresh obstructions are allowed to be erected, great damage will ensue to Canadian lumbermen and mill-owners along the St. John River. The undersigned, concurring in this view, recommends that a copy of this memorial be transmitted to His Majesty's Ambassador at Washington, and that Sir Mortimer Durand be again requested to bring the subject to the early attention of the United States authorities with a view not merely to the removal of the obstruction immediately complained of, but also to the postponement of any action on the part of the Maine Legislature with respect to legislation in the direction indicated above, until the International Commission which has recently been appointed to consider the whole question, shall have made its report.

All of which is respectfully submitted.

(Signed) R. W. SCOTT,

OTTAWA, February 1, 1905.

Secretary of State.

FROM LORD GREY TO SIR MORTIMER DURAND:

OTTAWA, February 3, 1905.

SIR,—With reference to my predecessor's despatch, No. 38, of May 5, 1904, requesting that representations might be made to the United States Government in regard to the erection of certain piers and booms in the St. John River, which was considered by this Government to involve a violation of Article III. of the Ashburton Treaty of 1842, I have the honour to enclose a copy of a further report from the Secretary of State of Canada, submitting a petition from certain lumbermen and mill-owners of St. John, New Brunswick, in which it is pointed out that so far from action having been taken to remove the obstruction to the navigation of the river of which complaint was made, a bill is now before the Maine Legislature to incorporate a company with power to construct other piers which will cause further damage to Canadian interests.

Your Excellency will observe that the Minister suggests that the matter again be brought to the attention of the United States authorities, with the view of obtaining the removal of the obstructions complained of, and postponement of action on the bill referred to, until the International Waterways Commission, recently appointed, shall have made its report.

I have, etc.,

(Signed) GREY.

HIS EXCELLENCY THE RIGHT HONOURABLE

SIR MORTIMER DURAND, G. C. M. G., Etc., Etc., Etc.

APPENDIX "M."

SIR H. M. DURAND TO LORD GREY:

BRITISH AMBASSY,

WASHINGTON, February 27, 1905.

MY LORD,—On receipt of Your Excellency's despatch, 3rd, relative to the erection of further piers in the St. John River, I at once addressed a note to the United States Government bringing the matter to their notice, and suggested that action be deferred on the bill pending before the Maine Legislature, and that obstructions already erected should be removed.

I have now the honour to transmit copy of the note which I have received from the United States Secretary of State in reply.

I have, etc.

(Signed) H. M. DURAND.

APPENDIX "N."

DEPARTMENT OF STATE,

WASHINGTON, February 24, 1905.

EXCELLENCY,—I have conferred with my colleagues of the Departments of War and Justice touching the suggestion made in your note of the 11th February, at the instance of the Canadian Government, that it would appear desirable that until the recently appointed Commission on International Waterways has submitted its report, action should be postponed upon a bill now before the Maine Legislature providing for the incorporation of a company with power to construct piers in the St. John River, additional to those complained of in your prior note of May 9, 1904, and that, meanwhile, the obstructions already erected should be removed.

It is the view of my colleagues that, under the 4th section of the River and Harbor Act of June 13, 1902, the function of the International Waterways Commission, the creation of which was authorized and invited by that Act, do not extend beyond the execution of the purposes therein defined, namely, the investigation of the problems of water level, water supply and navigation in the Great Lakes and tributary streams having their natural outlet by the River St. Lawrence to the Atlantic Ocean. The St. John River does not belong to the water system intended to be investigated, and, consequently, the future report of the International Waterways Commission would have no relation to the complaint now presented. It would remain a separate matter for consideration.

The attention of the Attorney-General has again been called to the matter of the existing obstructions in the St. John River.

I have, etc.

(Signed) JOHN HAY.

APPENDIX "O".

Extract from a Report of the Committee of the Honourable the Privy Council, approved by the Governor-General, on March 25, 1905.

The Committee of the Privy Council have had under consideration a despatch dated February 27, 1905, from His Majesty's Ambassador at Washington, concerning the scope of the International Waterways Commission.

The Minister of Public Works, to whom the question was referred, observes that the United States Secretary of State draws attention to the fact that the Act of Congress, authorizing the creation of the Commission, does not extend beyond the execution of the purposes therein defined, viz.: "The investigation of the problems of water level, water supply and navigation on the Great Lakes and tributary streams having their natural outlet by the River St. Lawrence to the Atlantic Ocean."

The Minister further observes that the Secretary of State states that as the St. John River does not belong to the water system intended to be investigated, the future report of the International Waterways Commission can have no relation to a complaint made concerning work executed and to be executed on the St. John River, which would, therefore, remain a separate matter for consideration.

The Minister, in view of the above statement, which would go far to restrict

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the range and scope of the International Waterways Commission, has procured a copy of the Act of Congress above referred to, and submits a verbatim copy of Section 4 of Chapter 1079, of the Statutes of the United States, passed by the 57th Congress, the Section in question being as follows, that is to say:—

“That the President of the United States is hereby requested to invite the
 “ Government of Great Britain to join in the formation of an International
 “ Commission, to be composed of three members from the United States and
 “ three who shall represent the interests of the Dominion of Canada, whose duty
 “ it shall be to investigate and report upon the conditions and uses of the waters
 “ adjacent to the boundary line between Canada and the United States, including
 “ all of the waters of lakes and rivers whose natural outlet is by the River St.
 “ Lawrence to the Atlantic Ocean, also upon the maintenance and regulation
 “ of suitable levels; and also upon the effect upon the shores of these waters
 “ and the structures thereon, and upon the interests of navigation by reason
 “ of the diversion of these waters from or change in their natural flow, and
 “ further to report upon the necessary measures regarding such diversion, and
 “ to make such recommendation for improvements and regulations as shall best
 “ subserve the interests of navigation in said waters.

“And said Commissioners shall report upon the advisability of locating a
 “ dam at the outlet of Lake Erie with a view to determining whether such dam
 “ will benefit navigation, and if such structure is deemed advisable, shall make
 “ recommendations to their respective Governments looking to an agreement
 “ or treaty which shall provide for the construction of the same; that they shall
 “ make an estimate of the probable cost thereof.”

The Minister further observes that throughout the correspondence which has taken place, prior to the appointment of the Canadian section of the Commission, the terms used have always been identical to those of the Act above referred to, and that it has always been understood that the investigation would bear upon the conditions and uses of the waters adjacent to the boundary line between Canada and the United States, the other waters belonging to the lakes and rivers whose natural outlet is by the River St. Lawrence to the Atlantic Ocean, being stated to be also included therein, but the general scope of the Commission being especially intended to apply to all waters adjacent to the boundary line between Canada and the United States.

The Minister, therefore, is of the opinion that in the despatch under his consideration an unintentional misapprehension has existed as regards the terms of the Act of Congress, and that it is fit and proper that the work of the Commission be not restricted to narrower limits than those indicated by the said Act.

The Minister, therefore, recommends that the necessary representations be made in order that the investigation to be carried on by the said Commission, and the report to be based thereon, shall extend to all the waters adjacent to the boundary line between Canada and the United States, and, therefore, include such portions of the St. John River as will come within the limit assigned by the Act of Congress to the work of the Commission.

The Committee advise that His Excellency be moved to forward a copy of this Minute to His Majesty's Ambassador at Washington.

All of which is respectfully submitted for approval.

(Signed) JOHN J. McGEE,
Clerk of the Privy Council.

APPENDIX "P".

DEPARTMENT OF STATE,

WASHINGTON, May 31, 1905.

EXCELLENCY,—I have the honour to acknowledge the receipt of Mr. O'Beirne's note of the 22nd instant, by which he informs me that he is instructed by Lord Lansdowne to express the hope that the United States Government will see its way, without necessarily conceding the principle of its contention as to the scope of the Waterways Commission, to agree to the wish of the Canadian Government that the Commission should deal with the question of the obstruction of the St. John River.

Serious consideration has been given to Mr. O'Beirne's note, and I regret to reply that this Government is unable to accede to the Canadian Government's wish. As your Embassy has been advised in a former note, this Government's construction of the Act of Congress is that the Waterways Commission created thereunder has no jurisdiction over the St. John River; and in the opinion of this Government such jurisdiction can be exercised only by authority of Congress. Moreover, as the questions which have arisen regarding the St. John River affect particularly the State of Maine and the Province of New Brunswick, such questions should be considered only by a commission on which both of them shall be represented.

I think I can assure Your Excellency that Congress will, in the early part of its next session, provide for a commission, to be joined with one from Canada, to examine fully into the questions in controversy between the business interests of Maine and those of New Brunswick with regard to the St. John River, and this Government sees no reason why the whole matter may not be satisfactorily adjusted by such a commission within a short period of time.

I have the honour to be, etc.,

(Signed) F. B. LOOMIS,

Acting Secretary.

THE RIGHT HONOURABLE SIR H. M. DURAND, ETC.

APPENDIX "Q".

INTERNATIONAL WATERWAYS COMMISSION

(Canadian Section.)

SECRETARY'S OFFICE,

OTTAWA, June 2, 1905.

HON. W. S. FIELDING

Minister of Finance,

Acting Minister of Public Works, Ottawa, Ont.:

DEAR SIR,—By direction of the Canadian section of the International Waterways Commission, I have the honour to report as follows:—

On May 11th last, the American Commissioners met in Washington and decided to invite the Canadian section to a joint meeting, to be held in Washington on the 25th of the same month.

The Commission actually met at the office of Colonel O. H. Ernst on May 25th, at 10.30 a.m. There were present: Mr. J. P. Mabee, Chairman of the Canadian section; Messrs. W. F. King and Louis Coste, members of the Canadian section, and Mr. Thomas Côté, Secretary of the Canadian section;

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Colonel O. H. Ernst, Chairman of the American section; Professor Gardner S. Williams and Mr. George Clinton, members of the American section.

The Commission proceeded in a body to call upon the Secretary of State, and after a brief interview with Mr. F. B. Loomis, First Assistant and Acting Secretary, returned to the first place of meeting, and devoted several hours to an informal discussion of the organization, permanent place of meeting, and scope of duties of the Commission, but came to no conclusion thereon, and at 1.45 p. m. adjourned to meet the next day, at 11 o'clock a.m.

On May 26th, the Commission met again at the office of Colonel Ernst, at 11 o'clock a.m. There were present all the members of the joint Commission and the Secretary of the Canadian section. An organization was effected by the election of Colonel Ernst as Chairman of this meeting, it being agreed that at meetings of the full Commission held on American territory, the Chairman of the American section should preside, and at meetings held on Canadian territory, the Chairman of the Canadian section should preside.

It was decided that for the present the offices of the Canadian section should be established in Toronto, and those of the American section in Buffalo, and that full meetings should be held in one or the other city from time to time, as should be found most convenient.

The American section presented the instructions under which they are acting, as embodied in the following letter, viz.:—

“DEPARTMENT OF STATE,

“WASHINGTON, D. C., April 15, 1905.

“GEORGE CLINTON, ESQ.,

“*Commissioner of the United States,*

“International Waterways Commission,

“1012 Prudential Building, Buffalo, N. Y.

“SIR,—Referring to your letter of the 10th ultimo, asking as to the instructions which may be required by the American Commissioners appointed under Section 4 of the River and Harbor Act of 1902 (Statutes-at-large, Volume 32, Page 375), especially in regard to a question which you state is likely to arise concerning the scope of the Commission's investigation, the Canadian members appearing to be disposed to regard it as taking in all waters adjacent to the boundary line, whether part of the Great Lakes or not, I have to state as follows:—

“The wording of the law will be seen by reference to the enclosed copy. The Department's opinion is that the words, ‘including all of the waters of the lakes and rivers whose natural outlet is by the River St. Lawrence to the Atlantic Ocean,’ are intended as a limitation of what precedes them, and that the investigation and report should cover only such waters, omitting the lower St. Lawrence itself, as well as all other waters not discharging naturally through it.

“The broader interpretation given to the Act by the Canadian authorities should be rejected, if for no other reason, on account of the smallness of the appropriation for the support of the American section. Congress could hardly have intended to provide, with a sum of \$20,000, for the expenses incident to an investigation extending to the Pacific Coast, and possibly embracing the Alaskan boundary as well.

“A portion of the report of the Chairman of the River and Harbour Committee, when reporting the bill (copy of Act herewith) treats of Section 4, and would appear to limit the scope of the investigation to the Great Lakes system.

“When the ground to be covered has been defined, the law itself appears to be sufficiently detailed to serve as instructions to the American Commissioners.

“It seems sufficient, therefore, at the present stage, to inform you and the

“ other members of the American section of the views held by the Department
 “ as to the scope of the investigation and report; and to request the American
 “ Commissioners to assemble and organize, as soon as possible after the 20th
 “ instant, at this capital, and to submit, after discussion, their own recommenda-
 “ tions as to further procedure.

“ I enclose, also, for your information, copies of letters from Colonel Ernst
 “ and Professor Williams, in regard to the place of meeting of the Commission.

“ Copies of your letter of the 10th ultimo and of this, the Department's
 “ reply, have been addressed to Colonel Ernst and Professor Williams for their
 “ guidance.

“ I am, sir, your obedient servant,

“ (Signed) F. B. LOOMIS,
 “ *Acting Secretary.*”

The Canadian section then communicated to the American Commissioners the views of the Canadian Government, which are embodied in the following extract from a report of the Committee of the Honourable the Privy Council, approved by the Governor-General on March 25, 1905:—

“ The Committee of the Privy Council have had under consideration a despatch, dated February 27, 1905, &c., &c.”

(See Order-in-Council, referred to under heading of Appendix “O,” page 26, of this report.)

The Canadian Section then presented the following memorandum:

“ The Canadian members of the International Waterways Commission had understood the scope of the Commission to be wider, &c., &c.”

(This memorandum will be found at page 6 of this report.)

(Signed) J. P. MABEE,
Chairman Canadian Section.

WASHINGTON, D. C., May 26, 1905.

The chairman of the American section stated that he was informed that the British Government had communicated with the American Government through diplomatic channels, requesting that the broader interpretation above described be given to the law of Congress, providing for the Commission, that the American Government had the matter under consideration, and that a decision could not be expected before the return of Secretary Taft to the city on Monday the 29th, or Tuesday the 30th ultimo.

It was decided that further action be deferred until the decision be given, and until further instructions be received from the two Governments. It was further decided that the decision of the American Government should be communicated to the chairman of the Canadian section as soon as received, and that if it be favourable to the Canadian interpretation of the law, or if it be unfavourable and be accepted by the Canadian Government, then a meeting of the Commission shall be called at Ottawa by the chairman of the Canadian section at as early a date as may be convenient to the members.

At 12.30 p. m. the Commission took recess until 4 p. m.

The Commission reconvened at 4 p.m., and having heard the minutes of preceding meetings read, approved them, and then adjourned *sine die*.

On Monday, May 29th, I called at the British Embassy and handed to His Excellency the Right Honourable Sir H. Mortimer Durand, copy of the minutes of the proceedings of the preliminary meetings of the Commission. He

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informed me that he would call on Wednesday, May 31st, on Secretary of War Taft and on Acting Secretary of State Loomis, to press again the Canadian interpretation of the Act of Congress, passed in 1902, and authorizing the formation of the Commission.

I have received to-day from Mr. O'Beirne, Secretary of the British Embassy and the charge d'affaires in Washington, during the absence of Sir H. Mortimer Durand, the following telegram: "This Government regret they cannot agree with your Commission dealing with St. John River. Have wired fully Governor-General. (Signed) O'Beirne."

The Canadian section is now awaiting further instructions from His Excellency the Governor-General-in-Council.

All of which is respectfully submitted.

(Signed) THOMAS COTÉ,
Secretary Canadian Section.

APPENDIX "R".

INTERNATIONAL WATERWAYS COMMISSION

(American Section)

OFFICE OF CHAIRMAN, ROOM 328, MILLS BUILDING,
WASHINGTON, D. C., June 2, 1905.

DEAR SIR,—I have the honour to inform you that our Government has found itself unable, after very serious consideration of the question, and after having submitted it to the Attorney-General, to accede to the desire of the Canadian Government to include the St. John River within the scope of the Commission's work, and that I am authorized to communicate this decision to you informally. It has been communicated formally to the British Government through diplomatic channels.

I am further authorized to assure you that it is the firm expectation of our Government that our Congress will, in the early part of its next session, provide for a commission to work jointly with one from Canada to examine fully into the questions in controversy between the business interests of Maine and New Brunswick, with regard to the St. John River.

Allow me to express the hope that this decision will not prevent the prosecution of the work of the Commission within the field prescribed to the American section, as communicated to you at our session held here on the 25th and 26th ultimo, and that I shall have many opportunities for renewing the agreeable acquaintance so auspiciously begun on that occasion.

Yours very respectfully,

(Signed) O. H. ERNST,
Colonel Corps of Engineers, Chairman American Section.

J. P. MABEE, Esq.,
Chairman Canadian Section.

International Waterways Commission,
Bank of Toronto Building, Toronto, Canada.

APPENDIX "S".

INTERNATIONAL WATERWAYS COMMISSION

(Canadian Section)

OFFICE OF CHAIRMAN, BANK OF TORONTO BUILDING,

TORONTO, June 7, 1905.

MY DEAR SIR,—I have the honour of acknowledging yours of June 2nd, advising me that the Government of the United States, after very serious consideration, has found itself unable to accede to the desire of the Canadian Government to include the St. John River within the scope of the Commission's work, but at the same time assuring me that it is the firm expectation of your Government that Congress will, in the early part of its next session, provide for a commission, to work jointly with one from Canada, to examine fully into the questions in controversy between the business interests of Maine and New Brunswick with regard to the St. John River.

The final position taken by your Government has been laid before the Government of Canada, and I have the honour of informing you that with full reliance of your assurance relating to the unfortunate differences regarding the uses of the waters of the St. John River, our Government has authorized the Canadian Commissioners to proceed with the inquiry within the field prescribed by the interpretation placed upon the Act of Congress by your Attorney-General, and at the same time, I am specially charged by the Premier of Canada to draw the attention of your section of the Commission to the condition of matters along the St. John River, and to the necessity of prompt joint action thereon.

A meeting of our section has been called for to-morrow, and I shall advise you at once of the date suggested for a joint meeting, pursuant to our arrangement at Washington.

Personally, I am gratified at the conclusion arrived at by our Government, and I am sure that my brother Commissioners of the Canadian section will look forward with great pleasure to the future joint meetings of these Commissions.

Believe me, my dear sir, yours very respectfully,

(Signed) J. P. MABEE,

Chairman of Canadian Section,
International Waterways Commission.

COLONEL O. H. ERNST,

Chairman American Section,

International Waterways Commission,

Mills Building, Washington, United States of America.

APPENDIX "T".

Extract from a Report of the Committee of the Honourable the Privy Council, approved by the Governor-General, on November 29, 1905.

On a report dated November 17, 1905, from the Minister of Public Works, submitting that at a meeting of the International Waterways Commission in the City of Buffalo, State of New York, on October 28, 1905, the following two reso-

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lutions, having reference to the use for manufacturing purposes of the waters of the River St. Mary and of River Niagara, were proposed and adopted:

“RESOLVED:—That this Commission recommends to the Governments
“ of the United States and Canada that such steps as they may regard as neces-
“ sary be taken to prevent any corporate right or franchises being granted or
“ renewed by either Federal, State or Provincial authority, for the use of the
“ waters of the Niagara River for power or other purposes until this Commission
“ is able to collect the information necessary to enable it to report fully upon the
“ ‘conditions and uses’ of those waters to the respective Governments of the
“ United States and Canada.”

(Signed)

J. P. MABEE,
Chairman Canadian Section.

(Signed)

O. H. ERNST,
Chairman American Section.

“RESOLVED:—That in the opinion of this Commission no further rights
“ or franchises should be granted or conferred regarding the uses or diversions
“ of the water flowing out of Lake Superior, by either the Government of the
“ United States or Canada, until all data and information are in the hands of
“ the Commission that may be necessary to enable it to make suggestions for
“ regulating the excess of these waters, or that, if such privileges be granted,
“ they be subject to any regulations that may be adopted by both Govern-
“ ments.”

(Signed)

J. P. MABEE,
Chairman Canadian Section.

(Signed)

O. H. ERNST,
Chairman American Section.

The Minister recommends—with a view to ratifying the above regulations—that the Government of Ontario be communicated with, laying before that Government contents of said resolutions, with a request that such means be adopted as may be thought proper to ensure their being carried out.

The Committee submit the same for approval.

(Signed)

JOHN J. MCGEE,
Clerk of the Privy Council.

APPENDIX “U.”

Whereas, by the River and Harbour Act, approved June 13, 1902, it is provided (32 Stats. L., 361) that, subject to the conditions therein mentioned:

“The Michigan Lake Superior Power Company, of Sault Ste. Marie, Mich-
“ igan, its successors and assigns, after first obtaining consent of the Secretary
“ of War and the Chief of Engineers and their approval of the said canal and
“ remedial works proposed, is hereby authorized to divert water from the St.
“ Marys River into its water-power canal, now being constructed at Sault Ste.
“ Marie, Michigan, for water-power purposes, while and so long as such works
“ and diversion of water from said river shall not injuriously affect navigation
“ therein, nor impair or diminish the water levels or any natural increase thereof,
“ either in Lake Superior, or in the United States ship canal and locks, or the
“ navigable channels, locks, or ship canals connected therewith, whether natural
“ or artificial, now existing or which may hereafter be established or created by
“ the United States for navigation purposes;”

And Whereas the said Michigan Lake Superior Power Company has submitted for the approval of the Secretary of War and the Chief of Engineers plans of its water-power canal and remedial works for the diversion of the water from the St. Marys River, authorized by said Act, and has applied for consent of the Secretary of War and Chief of Engineers to such diversions;

And Whereas, the Chief of Engineers has approved the said plans and has given his consent to such diversion, subject to the acceptance by said Company of the conditions hereinafter specified:

Now, Therefore, this is to certify that the Secretary of War hereby approves the said plans, which are hereto attached, and hereby gives his consent to the diversion of water from the St. Marys River, as authorized by said Act, subject to the acceptance by said Company of the following conditions:

1. That the regulation works, including escape valves at power, controlling works, and remedial works, shall be operated under the inspection of the engineer officer in charge of the St. Marys Falls Canal, who shall have access to them at all times.

2. That when the mean level of Lake Superior at the canal for any calendar month falls below 601.5 feet above mean tide at New York, according to the levels of the United States Lake Survey Office, the flow through the canal shall be reduced, the amount of reduction increasing as the monthly mean level falls until it reaches 601.0, when all flow shall be stopped until the monthly mean level again exceeds 601.0, all without claim against the United States or against any officer thereof.

3. That in addition to the requirements of condition 2 (supra), all flow shall likewise be stopped, without claim against the United States, or against any officer thereof, should the monthly mean level of the lake remain below 601.5 for a period of six consecutive calendar months, and shall not be resumed until the monthly mean level shall exceed 601.5.

4. That when the monthly mean level rises above 603.0, the flow through the canal and the remedial works shall be increased to their maximum capacity, and shall so continue until the monthly mean level shall be less than 603.0, without claim against the United States or against any officer thereof.

5. That should the monthly mean level of the lake remain above 603.0 for a period of six consecutive calendar months, said Company shall alter its work at its own expense as soon as practicable, so as to allow more flow.

6. That the United States shall have the right to assume entire control of the flow of water through the canal and remedial works in cases of accidents, or of emergencies temporarily affecting navigation through the United States ship canal.

7. That should cross currents detrimental to navigation be created by the intake or by the outflow of the canal, said Company shall construct such booms, training walls, or other works as may be necessary to remedy the evil.

8. That said Company, in its arrangement and construction of remedial works shall leave a suitable channel and water flow for the passage of logs over and through St. Marys Falls.

9. That these limitations are in addition to the special limitations of the Act of June 13, 1902, regarding riparian or other rights of any person or corporation and the remedies therefor.

10. That the elevations above mean tide at New York, above specified, are those established and in use at this date by the office of the survey of the northern and northwestern lakes, commonly known as the Lake Survey Office, at Detroit, Michigan.

11. Finally, the object and aim of the foregoing paragraph being to hold the waters of the Lake and River under the absolute control of the United States in the interest of navigation, it is expressly understood that said Company shall not be entitled to damages should the Government at any time or for any cause

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exercise its right to control and suspend the flow of water through the power canal, in the interest of navigation.

Witness my hand this 12th day December, 1902.

(Signed) ELIHU ROOT,
Secretary of War.

This instrument is also executed by the Michigan Lake Superior Power Company, by Francis H. Clergue, its president, thereunto lawfully authorized, this 9th day December, 1902, in testimony of the acceptance by said Company of the foregoing conditions.

THE MICHIGAN LAKE SUPERIOR POWER COMPANY.
(Signed) BY FRANCIS H. CLERGUE, President.

Attest:

H. VON SCHON,
F. T. TREMPER.

(Seal)

APPENDIX "V".

(Translated from the original.)

THOMAS CÔTÉ, Esq.,
Secretary International Waterways Commission.
Ottawa, Ont.

SIR,—At your request I went to Niagara in the latter half of October last. The object was, as you had written me a few days before, to determine whether the cataract will continue to recede at a rate equal to that observed since 1842.

There is no need to point out that a problem, to which geologists have already given years of work without having attained an absolutely certain result, could hardly be solved by a few days' study. However, my visit to Niagara was very useful to me, inasmuch as I could thereby verify *de visu* the facts already published, to say nothing of the personal observations which I was enabled to make.

The result of my studies upon this question is briefly summarized in the report which I now have the honour to submit. You will observe that of the authors whom I quote in my paper, not one is Canadian. I thought this would be preferable, with regard to our American friends, since it closes the door to the slightest suspicion of partiality.

I have the honour to be, sir, your obedient servant.

(Signed) J. C. K. LAFLAMME.

QUEBEC, November 9, 1905.

NOTES ON THE RETROCESSION OF NIAGARA FALLS.

SUMMARY:—

1. Uncertainties of the geological chronicle as relating to the holing out of the gorge and to the retrocession on the Falls of Niagara.
2. Character of the retrocession of the cataract.
3. Irregular course of the erosion at Niagara, in the past and in the future.
4. Limit of the rapid retrocession.
5. Secular oscillations of the basin of the Great Lakes and their influence on Niagara River.
6. Variations of the volume of water in the river, both on the Canadian and on the American side.
7. Influence of the electric works on the cataract.
8. Conclusion.

1. I will not undertake to give either the geological history of the Niagara River or that of the Falls. The history of the past has no part in the programme assigned to me. Moreover, to estimate what Niagara has been, through bygone geological ages, is an extremely complex problem. For more than half a century many great geologists, Canadian and American, have thoroughly studied the subject. In spite of their labours, and notwithstanding all the hypotheses, born of their investigations, or perhaps, owing to these very hypotheses it must be confessed that the question is far from being solved. If, in the main, the history of the Falls is now fairly well known, the details are yet ungrasped. And in the present instance, the details are of more importance than the general facts definitively recognized by science.

This disagreement among geologists becomes more evident when it is remembered that some of the best known assign 5,000 years as the time taken by the cataract to cut out its bed from the heights of Queenston to its present site, while others, of equal scientific standing, assert that no less than 50,000 years were required for hollowing out Niagara's gorge. Between these extreme figures are to be found the estimates of many others, which suffices to show that upon this point of the history of Niagara, agreement is far from absolute, and to prove, also, how uncertain and how susceptible to different interpretations are the data upon which we have to work.

I might, perhaps, say as much in regard to the specific question of the retrocession of the fall. The fact is known to almost everyone. But it is only since 1842 that measurements were made and that definite data were obtained.

Before that time, from Father Hennepin, in 1673, to the triangulation by James Hall, in 1842, it could be said that the Horseshoe had retreated, but, to what extent no one could definitely ascertain.

As it is this retrocession of the Falls which I have had more particularly to study, it may be well to detail the actual process as agreed on by all geologists.

2. On the whole length of the crest of the cataract, water flows over a thick bed of dolomitic limestone.

The upper layers, much broken and furrowed, overlie other parallel strata, more compact and more resisting. The whole is what is called the Lockport or Niagara Limestone. It is over the first series of these strata that the water of the river descends from the head of the rapids to the cataract.

Under this limestone, and parallel to it, lies a mass of foliated compact argillite, that constitutes almost all of the lower portion of the bank. These schistose masses are demolished both by the rebound from below, and the direct attack of the falling waters from above. They crumble and disappear, so that sooner or later the limestone layers above become overhanging, when deprived of the support which upheld them, then give way under the weight of the rushing water, and in falling cause the crest of the cataract to recede. Later, the same process is repeated, bringing about, each time, retrocession of the crest.

It is not then, as might be thought, the friction, although enormous, of the water, which wears away the layers of the bottom and causes them little by little to disappear; it is, rather, the destruction of the support of these beds which brings about their fall in large or small quantities. The process is one of demolition rather than one of erosion or dissolution.

3. Consequently, the extent of the retrocession, its direction, and its limit, all depend on data rather difficult to elucidate in detail, should there be reached a greater hardness in the argillitic lower beds; or again, should the limestone strata become more compact and more resisting, the retrocession will become slower. Reverse modifications in the physical condition of the beds would hasten it.

Differences on the resistance of the geological strata have equally to be taken into account when it is a question of forecasting the direction in which the retrocession will take place. Such direction must be largely influenced by the fact that through the vast expanse of the Horseshoe, some parts will naturally give

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way more easily than others under the disintegrating action of the waters. Finally, it must not be forgotten that, if the mass of waters be greater at one point than another, the limestone will break away sooner there than elsewhere, and the retrocession at such a point will be to the extent accelerated.

This will explain why the retreating of the Canadian Falls is three or four times more rapid than that of the American; why it takes place, so to speak, by spells, now quickly, now slowly *; why again it is more pronounced at certain points of the Horseshoe than at others: and why, lastly, it happens that it is not always most marked where there is most water.

It is therefore evident that the yearly rate of retreat of the cataract is continually varying, but further inquiry may question whether the figures given are strictly accurate. It must be remembered that the exact determination of the crest line of the Horseshoe, on which depends the estimation of the extent of the retrocession, can only be determined by a very minute triangulation based upon a certain number of fixed points on the shores and other points equally stable selected along the crest itself. Now, nothing is more unstable than a sheet of falling water. It may happen, and doubtless it does sometimes happen, that some of the points selected as guiding marks on the crest of the falls be not recognizable at the different shore stations or be confounded with near-by marks.

This explains certain anomalies to be found in the profiles of the Horseshoe as traced in 1842, 1875, 1886 and 1890, and reproduced by Mr. Spencer in 1894.† Unquestionably the strangest of them is to find that the profile of the Horseshoe is farther back in 1886 than in 1890, for at this particular point the fall is shown to have come forward during these years instead of receding. The same may be said about the profile of 1875 and 1886; they overlap each other on the west side of the Horseshoe.

Therefore, the problem to be solved, when measuring the retreat, is a very difficult one in its ultimate details, and only approximate figures can be reached, with little importance attaching to the fractions of a foot which the computation may give.

As a general conclusion, it may be said, without fear of contradiction, that we are not sufficiently acquainted with the intimate physical structure of the banks of limestone and shale that occasion the cataract to recede, to state positively either what is the regular rate of retreat, or that it will continue indefinitely, at the same rate, in the direction it has followed during, say, the last fifty years. At the present it seems to follow the outline of Goat Island; whether it will always do so, is unknown to us.

In the opinion of Mr. J. W. Spencer, whom I had the pleasure of meeting at Niagara, and whose geological studies of this locality, carried on for many years with an untiring devotion, are of great value, the erosion will continue for a time toward Goat Island, after which the western side will be affected.

A peculiar phenomenon occurs at the Falls; powerful jets of water from time to time spout upwards a hundred feet above the crest of the Horseshoe; they appear to be geyser-like explosions, brought about by a sudden very powerful vertical action. Their localization is quite definite. They are only seen where the two sides of the Horseshoe are closest together. It must be remembered that the regularity of the curve that gave the name of Horseshoe to the Canadian

*Mr. Grabau, in his *Geology and Palætiology of Niagara Falls and vicinity*, p. 83 gives the following figures as representing the mean retrocession of the Horseshoe as evinced by measurements made by Hall in 1842; by the Engineers of the Lake Survey in 1875; by R. S. Woodward in 1886, and by M. S. Kibbe, in 1890. Niagara retreated 2.01 feet per year from 1842 to 1875, 1.86 feet from 1875 to 1886, and 5.01 feet from 1886 to 1890. Last summer Mr. Spencer proceeded, with greatest care, to make new determinations of the profile of the cataract. They will, probably, when the computations are finished, give us another figure.

†“Duration of Niagara Falls.” *The American Journal of Science*, Dec. 1894, p. 461.

fall is now only to be seen at its extremities. The central part more nearly resembles a fairly sharp "V." It is at the apex of this "V" that the vertical spurts take place.

Many think them to be caused by air compressed behind the curtain of the cataract, which it rends from time to time in forcing an outlet. If this be so, why should this compressed air not escape at each end of the curtain by following the profile of the escarpment? There is no lack of space, since one can go behind the falling mass of water. Besides, when visiting the Canadian tunnel, which opens behind the enormous fall, there is no sensation of compressed air. Some would certainly exist there, although in a lesser degree than at the centre. Moreover, why should these explosions take place upwards and not perpendicularly to the falling sheet of water? I rather incline to see in them a hydraulic ram effect. The huge mass of rushing water meets jutting rocks, which it strikes with energy sufficient to shoot a part of this water to a higher point than the starting level.

But whatever may be the explanation of these mighty spouts they are an evidence of extreme mechanical action, a powerful process of erosion taking place at the apex of the "V," and so long as the crest of the Horseshoe keeps its present profile it must be at that point that the greatest amount of erosion will take place.

The caving in of large areas on the sides of the Horseshoe may modify this state of things and prevent the point of the "V" from eating away more ground than the rest.

4. Now, to resume the question of the Falls, from which these digressions have carried us.

I have attempted, above, to show the uncertainty of the computations hitherto made, regarding the rate of retreat. Moreover, even assuming these figures to be accurate, there is doubt if this rate will be maintained invariably and ever constant at the mean of the last fifty years.

As the Falls retreat, the thickness of the hard limestone beds increases. It will have reached its maximum when the point of the Horseshoe has arrived at the line of shoals close to the south end of Goat Island. On the other hand, the friable argillitic underpart of the profile of the escarpment decreases in thickness as the Falls draw nearer Lake Erie, owing to the general dip of the layers toward the south. Dr. J. H. Clarke, New York State Geologist, believes that when the cataract has reached the line of shoals above mentioned, the escarpment, will be wholly composed of the limestone strata, the dip of the argillites southward having reached the lower level of the river bed. By that time the fall will have grown some fifty feet higher than it now is, and the retreat, being thereafter exclusively the result of the wear of the limestone, will become slower.

5. A factor that must seriously affect this study of Niagara is the weight of the volume of water precipitated into the chasm. If, as before stated, the volume of water varies, one of the weightiest causes of retreat must also vary in the same proportion, and all the deductions drawn from the present data will suffer should there be any difference in the flow of the Niagara River. Now geologists tell us that the part of the surface of the American continent that includes the Great Lakes is subject to slow oscillations, which result in a general upheaval on the north-east or a sinking on the south-west. This secular crustal movement, slow, but continuous, will begin by retarding the flow of the water running north-easterly. Then, a time will come when Lakes Superior, Michigan, Huron and Erie, instead of draining through Lake Ontario, will send their waters toward the Mississippi through the southern extremity of Lake Michigan.

I may borrow the following figures from Mr. Grabau:* In 2,000 years Illinois and Niagara Rivers will share equally the waters of the Great Lakes. In 2,500 years, the Niagara will have but an intermittent flow. In 3,000 years Niagara

*Loc-cit. p. 65.

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will be no more, and all the immense hydrographic basin of the Great Lakes, save that of Lake Ontario, will drain into the Mississippi. Therefore, until then, discharge of Niagara must continually decrease and the eating away of the Falls will vary accordingly. We will see, later on, what is to be thought of these figures.

But before going further, are these crustal movements really so regular and constant, as they are said to be? They are found in Scandinavia, in Greenland, and on a number of other coasts. It is also known, however, that they do not occur with regularity, nor do they always work in the same way.

According to Dr. Clarke,* the shore at Percé on the Gaspé Coast, which was going down fifty years ago, is now rising. Who is unacquainted with the classic example of the famous temple of Serapis, in Italy, which, after having been for a long time buried under water, owing to the settling of the soil, emerged later on and attained several centuries ago, a level that has not varied since?

The crustal movements have every variety of period; some may be secular, some may last a few years only, and, to refer specially to the movement which may be affecting Niagara River, nobody yet knows its period. It may continue, it may come to an end, or it may reverse itself. It is, therefore, impossible upon such uncertain data to make very positive assertions, the reliability of which could never go beyond that of the premises. Such was the position lately taken by Dr. Clarke.

Consequently, the possible oscillations of the basin of the Great Lakes, are hardly worth taking into consideration in the study of such a problem as we have before us, unless we be willing to extend conjectures to a future so remote as to deprive them of any interest.

6. It may be asked whether the recession of the Falls will lessen the quantity of water which now flows along the Canadian shore in the upper rapids. On that score I do not believe that we have much to fear. No matter what direction the retreat may take, we shall have always more water than the Americans. The level of the river bed is lower on our side. The first sill of the upper rapids crosses the whole of the river dipping towards the Canadian shore; at this point it is considerably lower than on the American side. The Canadian fall is about ten feet lower than the American side and the water naturally bears towards our side; if the hollowing out of the Horseshoe should result in a modification of the general level of the river, there is reason to believe that we would not be the sufferers.

Moreover, it must not be forgotten that the Niagara River, where the Falls now exist, turns at almost a right angle, from south-east to north-west, and that, consequently, the great mass of its water strikes the Canadian shore before taking its new course.

The American channel barely carries the surplus. Already, in order to protect the Canadian wall from erosion, special measures have been taken.

The effect of this deviation is all the more accentuated since the bed of the river becomes much narrower at the very point where its course is changed. The flow is; so to speak, choked between Goat Island and the Canadian shore. The mass increasing, has a more marked tendency, by virtue of its inertia, to continue on its first course and thereby to bear towards our side.

It therefore matters little to us whether the new Horseshoe gorge in process of formation follows the centre of the river, or, as it had done for the last half century, works its way parallel to the shore of Goat Island. We do not believe that the volume of the Canadian waters will be seriously affected thereby.

The same thing cannot be said of the American channel. It will be dry before the new Horseshoe gorge has reached the line which joins the upper end of Goat Island to Dufferin Islands.

Already, owing to tapplings made at different points of the river, above the falls, the general level has been so modified that nearly every spring, according

*Loc-cit. p. 490.

to the citizens of Niagara, the ice from Lake Erie, not finding enough water to float it, runs aground at the entrance of the American channel and blocks it completely; so that the American fall for a few days ceases to exist. This phenomenon, which was exceptional before the establishment of the electric works, seems to have become an almost annual one.

7. Permit me to make the statement here, although this matter is not directly relevant to my instructions, that the danger which really threatens Niagara Falls is not so much from the wearing of its bed as from the abstraction of a large proportion of its waters by the electrical companies now, or likely to be, established.

Already, according to Dr. Clarke,* when the five electric companies now in operation at Niagara produce to their charter limits and abstract a total of 48,000 cubic feet of water per second, the water level will reach the bottom of the river at the American shore. And if these abstractions are multiplied, always above the Falls, the American fall will disappear finally; even the Horseshoe will lose a part of its majestic splendour.

Though, as before observed, this question, an extremely delicate one, whether considered from the standpoint of public or private interests, does not strictly enter into the scope of the present notes, I have deemed it well to place my views on it before the International Commissioners, in view of their high competence, of the great influence it is in their power to exercise with the constituted authorities. I may add that the preservation of the Falls in their present general state may itself become the object of an international understanding.

So grand a natural phenomenon, which every year attracts, it is said, more than eight hundred thousand visitors, is surely worth considering the insurance of its perpetuity.

On this subject may be read to advantage the very interesting paper by Dr. Clarke, entitled "The Menace to Niagara", published in the Popular Science Monthly for April last, and from which I have freely borrowed for the present report. In it the question is treated without *parti pris* and with great soundness of independent judgment.

8. Conclusion. Every year Niagara Falls are receding. The process of this retrocession is such that it is impossible to formulate any precise forecast as to its future rate and direction outside of generalities, all is more or less problematic.

This phenomenon is liable to many variations, owing to possible changes in the physical consistency of the geological beds over which the water descends. "What will be the character of the channel which is now being formed", says Mr. Grabau, "can only be a matter of conjecture."

At all events, I do not think the Canadian waters are, for long years to come, apt to suffer greatly from the retreat of the Falls, whatever be its direction.

During the recedence of the Horseshoe towards the upper sill of the rapids, everything leads me to believe that the Canadian side will always have its great share of the hydraulic force of the river.

Once the Falls have reached the upper ledge of the rapids in many hundreds of years (1,000 years, according to Grabau), assuming that the mean rate of retreat remain constant, which is far from certain, the retreat of the cataract will enter into a phase of relative rest and the erosion will henceforth hardly take any other form than the wearing out of the lips of the new gorge, particularly that of the Canadian side.

The American channel will have then long disappeared, and the intakes of the Canadian works, after having gradually become impoverished as the line of the fall is rectified and identified with the sill of the upper rapids, will end by being dry.

The fall will then be at the first sills of the rapids. It will be higher than the present cataract by some fifty feet, and will noticeably resemble the drawing which

*Loc-cit. p. 500.

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Father Hennepin left us of that which he saw in 1673, when the Horseshoe did not exist, and the American and the Canadian falls were on one plain. The only difference will be that the fall will then be single, Goat Island having joined the American shore.

Any one desirous of knowing in how many years the Falls will reach that point should study the figures of Mr. Grabau, quoted above. Perhaps it is more prudent to simply say with Dr. Clarke, that these estimates of geological chronology express interesting possibilities, but hardly rise to the dignity of probabilities.*

Mr. Grabau† himself, after having reproduced the figures which, according to C. H. Hitchcock, G. F. Wright, Spencer, Taylor, Pohlman and Lyell, give the geological age of Niagara, very wisely concluded by the statement that such figures are hardly more than the expression of personal opinions, and that they exclusively reflect the ideas which these writers have formed as to the rapidity of the erosion caused by the river. And he adds that there may be a reverse of causes still unknown which may have contributed, in a large measure, to lengthen or shorten this period. These causes, once known, will probably entail the revising of all calculations and will, no doubt, lead to different results.

In continuation of this thesis, it might be said that the factors yet undiscovered will possibly considerably modify all that has already been thought and written on the retreat of the Falls in particular. I believe there are few scientific problems in which the personal equation plays so great a part. This is why the present report, while being little more than a summary of the principal works on Niagara, contains such a small proportion of the figures and calculations so abundant in the numerous monographies written on the subject.

(Signed) J. C. K. LAFLAMME.

QUEBEC, November 9, 1905.

APPENDIX "W."

DEPARTMENT OF STATE,

WASHINGTON, January 25, 1905.

MY DEAR MR. AMBASSADOR,—With reference to your note of the 3rd instant, asking that a scheme for diverting the waters tributary to the international water boundary system by the Minnesota Canal and Power Company, of Duluth, Minnesota, be not carried out, pending the meeting of the International Water Boundary Commission, I take pleasure in informing you that I have received a letter, dated the 19th instant, from the Secretary of the Interior, stating that his Department had directed the Commissioner of the General Office, before whom the application of the said Company is pending, to suspend further action in the case, until advised as to the results of the international boundary inquiry.

I am, etc.,

(Signed) FRANCIS B. LOOMIS.

HIS EXCELLENCY THE RIGHT HONOURABLE SIR H. M. DURAND, G. C. M. G.

*Loc-cit. p. 489.

†Loc-cit. p. 85.

APPENDIX "X."

Extract from a Report of the Committee of the Honourable the Privy Council, approved by the Governor-General on September 19, 1905.

On a report dated August 11, 1905, from the Minister of Public Works, stating that in January, 1905, Mr. Edward Wellington Backus, of Minneapolis, made an application for himself and those associated with him under Chapter 92 of the Revised Statutes of Canada, for the right to construct a power dam across the Rainy River from a point in the town plot of Alberton, now the Town of Fort Francis, to a point in the State of Minnesota, U. S., opposite the said Town of Fort Francis.

The Minister further states that with this application were also transmitted to the Department of Public Works, plans showing the nature of the work to be performed, one being a sketch showing the location, and the other showing details of the mode of construction of the work.

The Minister further states that on January 19, 1905, the said E. W. Backus made with the Government of the Province of Ontario a certain agreement whereby the applicants obtained from the Government of the said Province a grant in fee of lands and power on the Canadian side of the International boundary for the purpose of developing the water-power there and utilizing storage facilities with a view of creating a large amount of power for the operation of mills and other manufacturing establishments, the consideration of such acquisition being stated in the agreement at \$5,000.00; the agreement in question containing several conditions as regards the character and dimensions of the works; the raising and maintaining of the waters of Rainy Lake; the use or non-use of flash-boards; the construction of power-houses; the expenditure of \$50,000.00 on the works within nine months from the date of the agreement; the delivery of power to the Town of Fort Francis after January 1, 1907, for municipal purposes and for public utilities; the operation and delivery of said power; the rate at which it shall be furnished; the intervention of the Lieutenant-Governor-in-Council concerning the price of the power or energy to be created, and several other agreements of different kinds always bearing upon the delivery and price of the energy to be manufactured out of the works approved by the agreement.

That the agreement also, in Clause 14 thereof, reserves and excepts all the rights of the Dominion of Canada in navigation and the improvement thereof by the construction of locks, dams, canals, and otherwise, the Government of the Dominion or the Province of Ontario to have the power to enter upon the premises and maintain and repair such canals, locks, dams or other works for the improvement of navigation without compensation. It is also agreed that no sawdust, chemical or other refuse of any kind shall be placed or deposited in the river, etc.

That the application so made by Mr. E. W. Backus, on behalf of the Ontario & Minnesota Power Company, was referred to the Chief Engineer of the Department of Public Works for report, and that the officer in question stated that in so far as the construction of the dam is concerned it would in no way interfere with navigation above or below the falls of Fort Francis but would, in fact, be an improvement; that the dangerous rapids two miles above Fort Francis would be flooded, thereby improving materially the navigation; that the freshet waters stored in Rainy Lake could be let out during the season of low water, thereby also considerably improving the navigation of the river between Fort Francis and Lake of the Woods; and that the only objection that could be raised to the proposed elevation of the dam is provided for by a proposed revetment wall to be constructed by the Company, and also by a clause in the Act of Incorporation of the Company, which makes all damages to lands caused by their works a charge to be borne by them. The resident Engineer quotes the opinion of the Chief Engineer

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of the United States Army, who says that the height of the dam appears to him unobjectionable, provided that the said dam is operated so as not to reduce the flow of Rainy Lake during the low water season.

That in addition to the report obtained from the Engineer of the Department of Public Works the matter was referred to the Department of Justice, and that it reported that, in so far as the Dominion Government was interested in the proposed works it had to consider them in so far as they affected the navigation and in so far as they affected the fishing, and also in so far as they could affect an unfinished canal and lock at the place where the dam is to be erected.

That at the Session of Parliament just closed the Ontario & Minnesota Power Company have obtained an Act by which that Company are authorized to construct and operate a water-power now existing at Fort Francis and build all necessary works for that purpose, provided no work so authorized shall be commenced until plans thereof shall have been submitted to and approved by the Governor-General-in-Council. The Act in question contains several clauses referring to the production of power or electrical energy, the delivery thereof, the construction of power-houses etc., the settlement of the price for power by the Board of Railway Commissioners; a clause is also inserted to prevent the diversion of that energy for use in the United States without an order of the said Railway Commissioners, the Board having full jurisdiction to enquire into the matter as often as necessary, and to prescribe any action on the part of the Company not inconsistent with the Act passed, etc.

That on communication with them on the matter, the Department of Marine and Fisheries have sent to the Department of Public Works a plan of the fishway which they think should be erected by the Company in connection with their works, the said fishway to be built subject to the inspection and approval of an officer of the Department of Marine and Fisheries.

The Minister recommends, in view of the above application of the Ontario & Minnesota Power Company; of this agreement with the Government of the Province of Ontario, a copy of which is hereto annexed; of the Act passed by the Parliament at its last Session, and of the reports made by the Chief Engineer of the Department of Public Works, and the report of the Department of Justice, that authority be given to approve of the plans submitted by the said Company, subject to the following conditions, viz.:—

1st. That the Company shall not, in the execution of their works, construct them in such a manner that they will in any way interfere with the navigation of the Rainy River either above or below the point where the works are to be constructed at any time during the season of navigation, and that they shall not increase the height of water either by the construction of the dam itself or by placing flash-boards upon the said dam in such a way as to reduce the natural depth of water below said dam, nor generally will they interfere in any way detrimental to the said navigation.

2nd. That at any time during the construction of the works, or after their construction or during their operation, the Minister of Public Works shall have the power, when it shall appear to him necessary after a proper examination, to regulate the retention or flow of water by or over the dam; to enter on the works for such investigation, and also to have the right to make such regulations and issue such instructions as may, to said Minister, appear advisable and necessary in the interest of navigation.

3rd. That the permission be granted subject to the conditions inserted in the agreement between the Government of the Province of Ontario and the applicants, and also subject to all the conditions and reservations expressed in the Act of Parliament passed at its last Session respecting the Ontario & Minnesota Power Company, Limited.

4th. That no work will be done under the permission to be given to the Company which will in any way interfere with the lock, canal or other works of

public nature already executed at Fort Francis by the Government of Canada, nor will any bridge or any other erection or construction of any nature whatsoever on, over or across said lock, canal or other works, be built, nor generally shall any use be made thereof, except by permission in writing given to that effect by the Minister of Public Works.

5th. That no work for the construction of any dyke or retaining wall provided on the plans submitted by the Company shall be commenced until the detailed plans thereof shall have been submitted and approved of by the Minister of Public Works.

6th. That should it appear necessary to the Minister of Public Works during the course of construction of the works hereunder to be authorized to cause said works to be interrupted for any changes, alterations, etc., as to him may appear advisable, then the Company will immediately cause the said works to be stopped forthwith, and will carry out any alterations or changes which may be ordered by the said Minister, and will conform in every way to the directions of the said Minister.

7th. That the Company shall provide in the execution of their works for the construction of the necessary fishway upon a plan and in a manner approved by the Department of Marine and Fisheries, the officers of that Department to have, for that purpose, the right of entering upon the work and seeing to the proper construction of the said fishway in accordance with whatever plans and specifications they may prepare.

The Committee submit the same for approval.

(Signed) JOHN J. McGEE,
Clerk of the Privy Council.

APPENDIX "Y."

Extract from a Report of the Committee of the Honourable the Privy Council approved by the Governor-General on November 21, 1905.

The Committee on the recommendation of the Minister of Public Works, advise that, in view of the appointment of Mr. J. P. Mabey as one of the Justices of the High Court of Ontario, Mr. George C. Gibbons, K. C., be in his place appointed chairman of the Canadian section of the International Waterways Commission.

(Signed) JOHN J. McGEE,
Clerk of the Privy Council.

APPENDIX "Z".

DETAIL REPORT OF THE SUB-COMMITTEE

MENTIONED AT PAGE 9.

INDEX OF MATTER CONTAINED IN THIS REPORT.

1. The River St. Clair.
2. The St. Clair Flats Canal and Lake St. Clair.
3. Lake Huron.
4. St. Marys River.
5. The Works of the Michigan Lake Superior Power Company.
6. The New West Neebish Channel.
7. The Works of the Chandler-Dunbar Water-Power Company and the Edison Sault Electric Company.
8. The revocable licenses granted by the United States War Department to the Chandler-Dunbar Water-Power Company.
9. The Works of the Consolidated Lake Superior Power Company operating on the Canadian side.
10. The Canadian Ship Canal.
11. The United States Ship Canal.
12. St. Marys River West of the Ship Canal, and White Fish Bay.
13. Lake Superior.
14. The Harbours of Port Arthur and Fort William.
15. The Water-Power of Kakabeca Falls.
16. The Harbour of Duluth.
17. The Proposed Works of the Minnesota Canal and Power Company.
18. The works of the Ontario and Minnesota Power Company at Koochiching Falls.
19. The Harbour of Chicago and the Chicago Drainage Canal.
20. Lake Michigan.
21. The Detroit River and Lime Kiln Crossing.

Detailed relation of an investigating trip made by a sub-committee of the International Waterways Commission, through the lakes and rivers connecting the same, including a visit to Sault Ste. Marie, Port Arthur, Fort William, Duluth, Chicago, Detroit, etc.

A committee, composed of Mr. James P. Mabey, chairman of the Canadian section, Mr. George Clinton, member of the American section, and the writer, secretary of the Canadian section, proceeded to Sault Ste. Marie on August 12, 1905, to investigate and report upon the uses of the waters of St. Marys River, as set forth in the Act of Congress, approved on April 13, 1902. In section 1, page 35, the duties of the International Waterways Commission, in regard to the matters at the Soo, are described as follows:—

“Subject to the express precedent conditions hereinafter mentioned, the
“ Michigan Lake Superior Power Company, of Sault Ste. Marie, Michigan, its
“ successors and assigns, after first obtaining consent of the Secretary of War
“ and the Chief of Engineers, and their approval of the said canal and remedial
“ works proposed, is hereby authorized to divert water from the St. Marys River
“ into its water-power canal now being constructed at Sault Ste. Marie, Michigan,
“ for water-power purposes, while and so long as such works and diversion of
“ water from said river shall not injuriously affect navigation therein, nor impair
“ or diminish the water levels or any natural increase thereof, either in Lake
“ Superior or in the United States ship canals and locks or the navigable channels,
“ locks, or ship canals connected therewith, whether natural or artificial, now
“ existing or which may hereafter be established or created by the United States

“ for navigation purposes; and conditioned further, that said Company shall
 “ establish, maintain and operate suitable and sufficient remedial and controlling
 “ works in the rapids of said river, to the approval of the Secretary of War and
 “ the Chief of Engineers; and said Company shall maintain and operate said
 “ canal and works in accordance with any rules and regulations that may
 “ hereafter be recommended by any international Commission and that shall
 “ become operative. Whenever, in the judgment of the Secretary of War,
 “ the operation of said canal and remedial and controlling works, or either of
 “ them, either in themselves or in conjunction with any other canal or canals
 “ in the United States or Canada which now, or hereafter may, exist, is injuri-
 “ ously affecting water levels or the navigation of Lake Superior, the River St.
 “ Marys, or other channels, locks or ship canals connected therewith as herein-
 “ before provided, he shall impose upon said Company such rules and regulations
 “ for the operation of said canal and remedial works, as may, in his opinion,
 “ be necessary to prevent such injury. It shall become his duty, and he shall
 “ have the authority to enter upon the property of said Company and to close
 “ said canal in whole or in part to the extent necessary to maintain water levels
 “ and to require said Company, at its own expense, to remove, add to or modify
 “ said works or any part thereof to the extent necessary to maintain water
 “ levels. Neither the Secretary of War nor the Chief of Engineers or any officer
 “ or other person acting under direction of them, or either of them, shall be
 “ in any way liable by reason of anything done in the execution of this provision.

“ All remedies herein provided, however, shall be cumulative, and shall be
 “ without prejudice to any other remedies either of the United States or of in-
 “ dividuals for failure of said Company to maintain said levels for navigation
 “ purposes, as herein provided.

“ Nothing herein contained shall be held to affect any existing riparian or
 “ other rights of any person or corporation, or the existing remedies therefor,
 “ or any action at law or equity now pending. The right is hereby expressly
 “ reserved to Congress to alter, amend or repeal the provisions contained in
 “ this paragraph.”

Mr. George Clinton went by way of Owen Sound, taking the Canadian Pacific Railway Company's Steamer, “Alberta,” and arrived at Sault Ste. Marie, Michigan, on Sunday, the 13th of August.

Mr. James P. Mabee and the writer proceeded to Port Huron, Michigan, to investigate the conditions and the uses of the waters of St. Clair River and Lake St. Clair. The start was made from Port Huron, Michigan, the visitors proceeding east.

I. THE RIVER ST. CLAIR.

The St. Clair River has two different sections—the upper or undivided channel, and the lower portion. The undivided channel runs from Lake Huron to the head of Chenal Ecarte, a distance by steamer track of about 27 miles. At this point the River begins to divide into a number of channels. The one used by vessels is called the “South Channel,” and its length, from the head of Chenal Ecarte to the south-west end of St. Clair Flats Canal, is about 13 miles, making the total length of the steamboat track, from Lake Huron to Lake St. Clair, about 40 miles.

The discharge through the upper or undivided portion of the river is 206,400 cubic feet per second, when Lake Huron is at a stage of 581.40 feet above mean tide at New York. The increase of discharge per foot rise of the Lake is approximately, according to the engineers of the United States Army, 19,238 cubic feet per second. The river leaves Lake Huron with a velocity, opposite Fort Gratiot, of about 5 miles an hour, and enters Lake St. Clair, through the Canal, with a velocity of about $1\frac{1}{4}$ miles an hour. At intermediate points

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the velocity varies irregularly between these limits. The banks of the river are clay and sand and usually quite steep; there are no rocks. There are two islands in the upper portion of the river: Stag Island and Woodtick Island.

Extensive dredging works have been performed by the Canadian Department of Public Works at Sarnia, in front of the Grand Trunk Railway wharf and the Lake Erie Ferry Slip. This has been done, as Sarnia is one of the principal harbours of the Grand Trunk Railway system and a stopping place for all Canadian passenger steamers passing through the St. Clair River. From the foot of George street, $3\frac{1}{2}$ to 5 fathoms can be carried close to the shore in front of and below the Grand Trunk Depot and continuing down to Fromefield. A bay with shallow water extends from the foot of George street up to Point Edward. The anchorage at the head of St. Clair River below the rapids and abreast of Port Huron and Sarnia, is good in clay and gravel. In the rapids abreast of Point Edward it is rocky and bad. Good holding ground and some clay are to be found on the Canadian shore below the Grand Trunk elevator. Vessels generally anchor as close to each shore as safety permits, to leave the mid-channel clear for passing vessels. Fixed red range lights at Point Edward lead into the head of the St. Clair River from Lake Huron. The front light is on the beach 107 feet back from the water edge, and is visible 8 miles from all points of approach by water. The rear light is 579 feet south of the front light and visible $9\frac{1}{4}$ miles in the line of range. This range is followed by vessels until intersected by the Fort Gratiot range, on the United States side of the River.

The Port Huron rapids are about two miles above the town of the same name. The velocity of the current at this point is about 5 miles per hour. Two range lights on the American side, one mile below Fort Gratiot light, mark the sailing line through these rapids. There is good holding ground in clay or gravel bottom between Port Huron and Sarnia. The shoal at the mouth of Black River is marked by two buoys, a gas buoy about midway between the mouth of the River and the Canadian side, and a black spar buoy about 2,000 feet below the gas buoy. Between these buoys and the Canadian side there is a channel with a minimum width of 1,000 feet, and a depth of 21 feet at a stage of 581.5 feet above mean tide at New York. Between the buoys and the American side there is a depth of 14.5 feet at the above stage. This shoal is not quite stable, but is, on the contrary, increasing at a slow rate. It will be perceptible in two or three years. The channel in Black River has a depth of 15 feet up to the Grand Trunk Railway bridge. At Stag Island, the American channel has a depth of 21 feet, at a stage of 577.5 feet above mean tide at New York, and a minimum width of 900 feet. The Canadian channel has a minimum width of 550 feet and a depth of 28 feet at the above stage. A crib marks the lower entrance, and two range lights mark the upper entrance to this channel. At Corunna, opposite Stag Island channel, the Canadian channel is in the best order. There are range lights to guide through good water past the shoals at the head of Stag Island, and also past the shoals at the mouth of Talford Creek, which coming from the Indian Reservation, in the County of Lambton, Ontario, flows through Fromefield into the river, right opposite Marysville, Mich

Mooretown and Courtright, Ontario, which are just $1\frac{1}{2}$ miles apart, were visited. The Lake Erie and Detroit River Railroad runs through the village of Mooretown. There are two wharfs with about 16 feet of water. Baby's Creek enters St. Clair River about one-third mile below the village. At Courtright, opposite the town of St. Clair, Michigan, there is good water along the wharfs with depths of 15 to 20 feet. At St. Clair, Michigan, the American channel has a minimum width of 800 feet and a depth of 21 feet at a stage of 577.0 feet above mean tide at New York. The Canadian channel has a depth of 26 feet at the above stage, with a minimum width of about 800 feet. Pine River empties into St. Clair River at St. Clair, Michigan. The original depth of that river over the bars was 5 to 8 feet. In 1897 the channel from the mouth

of the river to the shipyard was dredged to a depth of 14 feet, and in 1899 further dredging was done from the shipyard to Belknap's brickyard to a depth of 12 feet. The present available depth in these two channels is 13 and 11 feet respectively. The shoal or middle ground between the American and Canadian channels, between St. Clair, Michigan, and Courtright, Ontario, is marked by two gas buoys, one at the upper and one at the lower end.

At Sombra, Ontario, opposite Marine City, Michigan, there are two wharfs, one-third mile apart, extending about 200 yards in shallow water to 13 feet at the outer ends. At this particular point the channel on the American side is straighter and wider, and, therefore, more frequently used than the Canadian channel.

At Marine City, Michigan, the United States Government had dredged in 1897, at the mouth of the river to the first bridge, a channel 75 feet wide and 15 feet deep. In 1899 the channel was dredged to Broadway Bridge, to a width of 75 feet and a depth of 14 feet.

The vessel route at the mouth of St. Clair River is through the boundary line channel. The United States Government at this point has expended large sums of money in improving the channel, by driving piles and dredging between them. The greater portion of the improvements were made on the United States side of the line; but some of them were also made in Canadian waters, and inasmuch as the improved channel has completely obliterated the natural one, it follows that the improved channel, regardless of its alignment, is and has always been considered a common channel to Canada and to the United States. From the St. Clair Flats to Lake Huron, the route follows the boundary line, except when passing Woodtick Island and Stag Island, where it is in United States waters, yet, there is also a good channel in Canadian waters past the Islands just named.

A short distance from Marine City, Michigan, and Sombra, Ontario, is Woodtick Island, and a little farther east, the village of Port Lambton, Ontario.

Past the Chenal Ecarte there is the village of Algonac, Michigan, opposite Russel Island, at the head of the north channel. This north channel, opposite Pointe aux Trembles, Michigan, divides into two sections, one flowing through Chenal a Bout Rond into Goose Bay, the other flowing into Anchor Bay.

Opposite Grand Point, on Herson Island, in the south channel, the wreck of the steamship "Minnesota," which was burnt and sunk in October, 1903, close to Squirrel Island, had been removed during the latter part of 1904, and in 1905 it was ascertained that there is at this particular site a depth of 25 feet of water.

Between Walpole Island and Squirrel Island, there is the Canadian blind channel, which is used only by local and small craft, the average depth of the water in the channel not exceeding eight or nine feet.

On the left side of Squirrel Island there is also the Basset channel, which is scarcely used, except by small vessels.

Between Herson Island and Dickenson's Island, lies the middle channel, which flows from the north channel into the Big Muscamoot Bay.

2. THE ST. CLAIR FLATS CANAL AND LAKE ST. CLAIR.

It will, therefore, be seen that originally the St. Clair River emptied into Lake St. Clair through several principal mouths or passes, the channels originally used being the north channel, the middle and the south passes. While each of these mouths or passes, constituting the delta known as the St. Clair Flats, afforded good water, especially the north, middle and south passes, yet all were obstructed by sandy deposits forming bars in the Lake.

The improvement of a channel through these Flats has been the subject of discussion ever since the upper lake region had any commerce to speak of. A survey of the locality was made as early as 1841, and in 1852 the United States

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Congress made an appropriation of \$20,000 for plans and examinations, having in view the improvement of the south pass. But it was only in 1855 that the work of improving the navigation of the St. Clair River at the "Flats" was actually commenced under the direction of the Buffalo Board of Trade. The funds were obtained by subscriptions from the United States lake ports interested in the lake trade. The project was to dredge a channel 60 feet wide and 12 feet deep in the middle channel of the south pass, $1\frac{1}{2}$ miles, west of the boundary line route now in use.

In 1857, under a United States appropriation of \$50,000, the improvement was continued on the same line, and in 1858, the Canadian Government contributed towards the still further improvement on the same line, which sum was expended under the direction of the Buffalo Board of Trade, under arrangements approved by the Canadian Government. One of the conditions was that the money would not be spent until a channel of 125 feet wide and 12 feet deep had been first excavated by the United States, which was done. This channel was found to be difficult to maintain and navigate. The present St. Clair Flats Canal was projected in 1866 by Colonel Cram, of the United States Army Corps of Engineers.

The first plan provided for a straight channel, 13 feet deep and 30 feet wide, across the Flats east of the mouth of the old channel. This was completed in 1871. The canal was protected on either side by a dike 7,227 feet long, making an aggregate of 14,452 feet of timber cribs resting upon piles driven into the original bottom of the shoal. A lighthouse was installed at each end of the eastern pier.

In 1873 the channel was deepened to 16 feet by dredging for a width of 100 feet on either side of the axis of the canal, or a width of 200 feet in all. This was done on account of the fact that the single row of sheet piles intended by the project of Colonel Cram, in 1866, for a depth of 13 feet, had not sufficient penetration to admit dredging to 16 feet for the full width of the canal.

In 1886, another plan of improving the channel was adopted. It consisted in driving a double row of sheet piling to a depth of 26 feet along the channel face of each dike, dredging the area between the dikes to a depth of 20 feet. The channel above and below the canal was to be dredged to the same depth in the River and in the Lake. But, subsequently, it was considered sufficient to obtain a depth of 18 feet. This work was completed in June, 1892. The pile revetment along the channel face of each dike was then finished, and a channel of 18 feet deep from about 900 feet above the canal in St. Clair River to about 3,300 feet below the canal was available. This depth of 18 feet was obtained for the full width of the canal, viz.: 300 feet or more for its full length. At the lower end of the canal, the 18 feet deep channel gradually widened to a width of 380 feet, at a distance of 300 feet below the canal. From that point to a farther distance of 3,300 feet below the canal, the width of the channel had a uniform width of 380 feet.

In 1891, the late Colonel O. E. Poe, of the Corps of Engineers of the United States Army, submitted an estimate for a channel of 20 feet deep, extending from a point about 1,500 feet above the canal, then through the canal and thence to about 10,000 feet into Lake St. Clair, with a width of 600 feet at its lower end. This plan was adopted and embodied in an Act of Congress of July 13, 1892.

The work was commenced in April, 1893, and completed in December, 1894, at a cost of \$107,024. At the time, the dikes of St. Clair Flats Canal were 7,221 feet long each, and the channel faces were riveted with double rows of sheet piling 26 feet deep, and the backs of the dikes were protected against the action of the waves by shorter sheeting. The canal had a clear width of 295 feet between the dikes, and a depth of 20 feet. The channel had also a depth of 20 feet from deep water in St. Clair River to deep water in Lake St. Clair, with a width above the canal of 650 feet, thence gradually narrowing

to the canal; thence having the full width of the canal over its entire length; thence gradually widening to a width of 800 feet at deep water in Lake Erie.

The cost of the improvement of the St. Clair Flats Canal, from the beginning in 1852 to 1896, is \$809,859.06, divided as follows:—

Cost of North Channel of South Pass, 1852 to 1858 . . .	\$ 64,829 01
Cost of South Channel of South Pass, 1858 to 1895, for completing project of 1868, Channel 13 feet deep, single sheet piling	461,090 01
For completing project of 1892, including repairs to July 1, 1881	115,933 53
For completing project of 1886, Channel 18 feet deep, second row sheet piling	168,007 51

Total cost \$809,859 06

In 1902, the United States Congress authorized the construction of a second channel, similar to the one already in use and parallel to it, but separated therefrom by a dike of about 100 feet wide, so as to provide a channel of 20 feet minimum depth and about 300 feet wide, from Lake St. Clair up into St. Clair River, for ascending boats, and a similar channel for descending vessels.

The work was started in 1904 and was in way of being completed during the summer of 1905. The appropriation made by the United States Congress for this improvement is \$330,000, making total appropriation for the St. Clair Flats Canal, from 1866 to 1903, \$1,094,810. With the amounts spent in 1852 and 1856, by the United States and the Canadian Governments, it makes a total expenditure of \$1,149,810, incurred in this undertaking.

The St. Clair Flats Ship Canals, en resume, comprise the dikes, the water between the dikes, and the improved channels of approach, both above and below the dikes. The improved approach above the dikes is 800 feet long; that below the dikes 11,000 feet long, and the dikes themselves are 7,221 feet long, making the total length of canal of about 19,000 feet.

The canal is marked by two lighthouses and two gas buoys. The lighthouses show the range of both the upper and lower approaches. The gas buoys are about one mile below the dikes and mark the east and west sides of the lower approach.

The width between the dikes and the width of the upper approach is 292 feet. The width of the lower approach is 400 feet. The depth at a stage of 575.0 feet above mean tide at New York is 24 feet. During the lowest water of the season of 1904, a draught of 19 feet could be carried through this channel.

Some years ago there was a dispute as to whether the St. Clair Flats Canal was in Canadian waters or in the waters under the jurisdiction of the United States Government. Investigation and reports were made on this subject by the Corps of Engineers of the United States Army, and by engineers engaged by the Canadian Government. The reports did not agree. But there is no doubt that part of the St. Clair Flats Canal is in Canadian territory, and that this improved water communication now in general use across the St. Clair Flats, is more or less on the boundary line between Canada and the United States. As such, this water communication is common to the trade of the lakes of both countries. Article XXVII. of the Treaty of Washington, 1871, states that "the subjects of Her Britannic Majesty shall enjoy the use of the " St. Clair Flats Canal on terms of equality with the inhabitants of the United " States."

From the southwest end of the St. Clair Flats Canal to Windmill Point lighthouse in Detroit River, the steamer track has a length of 17 miles. The area of the water surface of Lake St. Clair is 4,450 square miles. According to the United States Weather Bureau, the average annual rainfall in Lake St. Clair is 36 inches. The average date of opening of navigation at St. Clair Flats light-

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house is April 4th, and the average date of closing of navigation at the same place is December 15th.

After a short visit to Detroit and Windsor, the members of the sub-committee returned to Port Huron by the Detroit River and Port Huron Electric Railway.

3. LAKE HURON.

The members of the sub-committee left Monday afternoon, the 14th of August, on the steamship "Monarch," of the Northwestern Navigation Company, for Sault Ste. Marie, crossing Lake Huron from Sarnia to Detour in little less than twenty-two hours. The distance between Point Edward, Ontario, opposite Fort Gratiot, Michigan, to Detour passage is 220 miles. The steamer track from Fort Gratiot, Michigan, to the Straits of Mackinac is 243 miles. From Point Harris to Drummond Island, in a right line, the distance is 206 miles. The maximum depth recorded is 750 feet. Lake Huron has an area of water surface of 23,200 square miles. Its drained area is 52,100 square miles, making a total area of its basin of 75,300 square miles. The average annual rainfall in Lake Huron is 32 inches. Its mean surface above mean tide at New York city, during 45 years, from 1860 to 1904, is 581.40 feet. The standard high water, established in 1838, above the mean tide at New York city, is 584.69 feet, and the standard low water above mean tide at New York city, said standard being adopted for new charts, is 578.51 feet. The mean surface of Lake Huron below the mean surface of Lake Superior is 20.89 feet, and its mean surface above mean surface of Lake Erie is 8.79 feet, the discharge of St. Clair River at the mean stage of Lake Huron (581.40 feet) is 206,400 cubic feet per second. The increase in discharge per foot rise of the Lake is 19,238 cubic feet per second. The average date of opening of navigation at Sarnia, or Point Edward, is the 6th of April, and the average date of closing of navigation at the same point is 19th December.

Around Lake Huron on the Canadian side, there are storm-warning stations at the following places: Amherstburg, Bayfield, Collingwood, Depot Harbour, Goderich, Kincardine, Midland, Owen Sound, Parry Sound, Presque Isle, Sarnia, Saugeen and Tobermory. There are also life-saving stations at Collingwood and Goderich. On the American shore we find life-saving stations at Bois Blanc Island, Grindstone City, Hammond Bay, Lakeview Beach, Middle Island, Ottawa Point, Pointe aux Barques, Sand Beach, Sturgeon Point, Tawas Point and Thunder Bay Island.

The United States Weather Bureau has established storm-warning display stations at the following places, on the American coast of Lake Huron: Alpena, Bay City, Cheboygan, Detour (at the outlet of St. Marys River), Detroit, East Tawas, Harbour Beach, Lakeview Beach, Mackinac Island, Mackinaw, Middle Island, Oscoda, Ottawa Point, Pointe aux Barques, Port Huron, Presque Isle, Tawas Point and Thunder Bay Island.

4. ST. MARYS RIVER.

The vessels enter St. Marys River from Lake Huron, at Detour Passage at a point $1\frac{1}{2}$ miles from the lighthouse of Point Detour. They thence proceed north in a straight line for a distance of three-quarters of a mile up to Frying Pan lighthouse. At this point they turn a little to the left and proceed again in a straight line for a distance of $1\frac{1}{2}$ miles to Pipe Island lighthouse, which is situated at the south-eastern end of Potagannissing Bay, where they turn farther to the left. From Sweet's Point the vessels again turn a little farther to the left and proceed in a straight line for a distance of $2\frac{7}{8}$ miles to Sweet's Point light. Off Sweet's Island, from Sweet's Point light, they proceed for a distance of $4\frac{1}{2}$ miles, passing at a short distance off Lime Island up to a point opposite Raber Point, Michigan, thence turning straight north and passing to the right of Round

Island, opposite Hay Point, Ontario, and Pointe aux Frenes, Michigan, covering a distance of four miles.

From Hay Point the vessels enter the Mud Lake channel. After a distance of $6\frac{3}{4}$ miles they reach the Mud Lake beacon, opposite Winter Point on the east end of Neebish Island, thence for a distance of four miles they proceed north, up to the Sailors' Encampment channel, thence they reach Little Mud Lake channel, the Middle Neebish channel and the Hay Lake channel, passing to the left of Middle Hay Lake front light and to the right of Frechette Point, thence through the Little Rapids channel up to the Soo.

Navigation around the rapids of Sault Ste. Marie is provided for by two canals; one on the United States side and one on the Canadian side. Between the canal and the lighthouse at the entrance of Hay Lake channel, the United States Government, during the season of 1905, has removed the Bayfield and other adjacent shoals to the extent of securing a channel of 21 feet deep and 1,500 feet wide. At the head of Sugar Island, about two miles below the canal locks at Sault Ste. Marie, the channel divides in two. The old line of travel, known as the Lake George Route, passes to the northward and eastward of Sugar Island through Lake George and East Neebish. The new line, known as the Hay Lake Route, passes to the west of Sugar Island through Hay Lake and Middle Neebish. The two routes reunite at the head of Little Mud Lake. The distance from Point Iroquois to Detour by the Hay Lake Route is 6.4 miles and by the Lake George Route 7.5 miles. The least width of the channel by way of Hay Lake is 300 feet, limited to a total distance of 8 miles. The general width of the channel is 600 feet or more, and the least depth at the present prevailing stage of water is about 19 feet. The least width of the channel by way of Lake George is 150 feet, and the least depth about 15 feet. Both roadsteads are well defined by numerous buoys and by the mid-channel ranges.

There is another important channel known as the St. Joseph channel, with least depth of 13 feet, which leaves the Lake George and Hay Lake channel near their junction at the south end of Sugar Island, and passing to the northward and eastward of St. Joseph Island, leads into Manitoulin Bay or north channel, thence to Georgian Bay by way of Clapperton Main Passage and Little Current, or directly into Lake Huron through channels on the east and west sides of Cockburn Island, called, respectively, the Nississagi Strait and False Detour channel. These channels are all in Canadian waters.

From Detour Passage to Sault Ste. Marie, parts of Lake George channel from Little Rapids to the foot of Sugar Island are in Canadian waters. The upper part of the channel in Little Mud Lake and east channel at Sailors' Encampment, and part of the angle of the west channel, are also in Canadian waters. The United States Engineers in charge of the Public Works Department of the War Office at Sault Ste. Marie, claim that the above improvements were made with the tacit consent of the Canadian Government. Lake George channel was made from 1869 to 1882. Little Mud Lake was dredged from 1892 to 1894 at a cost of \$23,000. Sailors' Encampment channel was commenced in 1882 and finished in 1895 at a cost of \$23,000. Further improvements in that channel were made from 1903 to 1905 at a cost of \$11,000. Further improvements at the head of Sailors' Encampment were being made by the removal of boulders, sand and rock, from an area of 1,400 feet long and 200 feet wide on the west side of the channel just above Johnson's Point, and on the east side of the channel by the removal of sunken cribs and boulder ridges covering an area of 1,800 square yards. This important work has been proceeded with during the whole summer. At the foot of Little Mud Lake the angle in the channel was widened last year on the east side by the removal of 49,033 cubic yards of sand and boulders from an area of about 15,700 square yards, and on the west by the removal of 3,941 cubic yards from an area of 2,400 square yards.

The improvement of Hay Lake and Neebish channel was commenced in

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1893 and opened to navigation in 1894. The result was a new line of travel through St. Marys River, 11 miles shorter and four feet deeper than that previously available, and one which can be navigated at night with a reasonable degree of safety. In 1902 a project was adopted providing for a channel of 21 feet available depth at low water and 1,000 feet width from St. Marys Fall Canal to the foot of Hay Lake, thence deepening to 21 feet the present 300 foot channel to Mud Lake, via Middle Neebish, and opening a new 300 foot channel to Mud Lake, via West Neebish, thus providing separate channels through this stretch for up and down bound boats.

In 1904 the United States Government, in Hay Lake channel, spent \$2,738,081.39, and during the present season of navigation a further expenditure of \$1,221,033.61 was incurred. Below the islands, at Little Rapids, the channel has been improved for a distance of 10,200 feet, by widening on the east side 150 feet, to a depth of 21 feet. The channel through the Little Rapids section of the upper entrance to Hay Lake is, therefore, at present 600 feet wide. The deepening to 21 feet through Little Rapids was completed in 1904, from the head of the islands to Frechette Point. The deepening from Frechette Point to Six Mile Point was in progress during the summer of 1905.

The deepening of Nine Mile Point shoal to 22 feet was commenced in 1904 and was finished in August, 1905.

A very large boulder shoal with at least a depth of 12 feet over it, called Crab Island shoal, lies in 23 feet of water near the western end of the shoal, about half a mile south-west of Barbed Point and about 1,000 feet east of the usual course of vessels through Detour Passage. There are a number of boulders in the vicinity with less than 20 feet over them. A red spar buoy marks the most westerly boulders of Crab Island. A derrick-boat and diving outfit have been employed during midsummer of 1905 in removing the boulders from the west end of this shoal.

The sub-committee arrived at Sault Ste. Marie, Ontario, on Tuesday afternoon, the 15th of August. They were met at the Canadian Government dock by Mr. George Clinton and Mr. Lochlan P. Morrison, junior assistant engineer of the River Improvements Office, who, in the absence of Lieut.-Col. Chas. E. L. B. Davis, of the Corps of Engineers of the United States Army, in charge of the district, had been directed to receive the committee officially. The members of the committee immediately embarked on the United States Government Steamer "Alfred Noble," and crossing the River they proceeded at once to visit the power canal and the plants of the Michigan Lake Superior Power Company, being accompanied by Mr. Louis H. Davis, chief engineer of the Consolidated Lake Superior Power Company.

5. THE MICHIGAN LAKE SUPERIOR POWER COMPANY

Was incorporated in virtue of the Act No. 39 of the Public Acts of the State of Michigan, 1883. This Act, with the amendments thereto, is the legal authority for the Michigan Lake Superior Power Company to do business in the State of Michigan. The Congress of the United States in 1902, by an Act approved on the 13th June, making appropriation for the construction, repairs and preservation of certain public works on rivers and harbours and for other purposes, authorized the Michigan Lake Superior Power Company to build its canal on the American side, and after the approval of this Act, the United States War Department granted the Company the following permit:—

"WHEREAS, By the River and Harbour Act, approved June 13, 1902, it is provided (32 Stats., 361) that, subject to the conditions therein mentioned:

"The Michigan Lake Superior Power Company of Sault Ste. Marie, Michigan, its successors and assigns, after first obtaining consent of the Secretary of War and the Chief of Engineers and their approval of said canal and remedial

“ works proposed, is hereby authorized to divert water from the St. Marys
“ River into its water-power canal, now being constructed at Sault Ste. Marie,
“ Michigan, for water-power purposes, while and so long as said works do not
“ affect navigation therein, nor impair or diminish the water levels or any natural
“ increase thereof, either in Lake Superior, or in the United States ship canal
“ and locks, or the navigable channels, locks, or ship canals connected there-
“ with, whether natural or artificial, now existing or which may hereafter be
“ established or created by the United States for navigation purposes:

“ AND WHEREAS, The said Michigan Lake Superior Power Company
“ has submitted for the approval of the Secretary of War and Chief of Engineers
“ plans of its water-power canal and remedial works for the diversion of the
“ water from the St. Marys River, authorized by said Act, and has applied for
“ consent of the Secretary of War and Chief of Engineers to such diversions:

“ AND WHEREAS, The Chief of Engineers has approved the said plans,
“ and has given his consent to such diversion, subject to the acceptance by said
“ Company of the conditions hereinafter specified:

“ NOW, THEREFORE, This is to certify that the Secretary of War hereby
“ approves the said plans, which are hereto attached, and hereby gives his
“ consent to the diversion of water from the St. Marys River, as authorized by
“ said Act, subject to the acceptance by said Company on the following con-
“ ditions:

“ 1. That the regulating works, including escape valves at power house,
“ controlling works, and remedial works, shall be operated under the inspection
“ of the engineer officer in charge of the St. Marys Falls Canal, who shall have
“ access to them at all times.

“ 2. That when the mean level of Lake Superior at the canal for any cal-
“ endar month falls below 601.5 feet above mean tide at New York, according to
“ the levels of the United States Survey Office, the flow through the canal shall
“ be reduced, the amount of reduction increasing as the monthly mean level
“ falls until it reaches 601.0, when all flow shall be stopped until the monthly
“ level again exceeds 601.0, all without claims against the United States, or
“ against any officer thereof.

“ 3. That in addition to the requirements of condition 2 (*supra*), all flow
“ shall likewise be stopped, without claim against the United States, or against
“ any officer thereof, should the monthly mean level of the Lake remain below
“ 601.5 for a period of six consecutive calendar months, and shall not be resumed
“ until the monthly mean level shall exceed 601.5.

“ 4. That when the monthly mean level raises above 603.0, the flow through
“ the canal and the remedial works shall be increased to their maximum capacity,
“ and shall so continue until the monthly mean level shall be less than 603.0
“ without claim against the United States, or against any officer thereof.

“ 5. That should the monthly mean level of the Lake remain above 603.0
“ for a period of six consecutive calendar months, said Company shall alter its
“ works at its own expense as soon as practicable, so as to allow more flow.

“ 6. That the United States shall have the right to assume entire control
“ of the flow of the water through the canal and remedial works in cases of
“ accidents or emergencies temporarily affecting navigation to the United States
“ ship canal.

“ 7. That should cross currents, detrimental to navigation, be created by
“ the intake or by the outflow of the canal, said Company shall construct such
“ booms, training walls, or other works, as may be necessary to remedy the evil.

“ 8. That said Company, in its arrangement and construction of remedial
“ works, shall leave a suitable channel and water flow for the passage of logs
“ over and through St. Marys Falls.

“ 9. That these limitations are in addition to the special limitations of the

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“ Act of June 13, 1905, regarding riparian or other rights of any person or corporation and the remedies therefor.

“ 10. That the elevations above mean tide at New York, above specified, are those established and in use at this date by the Office of the Survey of the Northern and Northwestern Lakes, commonly known as the Lake Survey Office at Detroit, Michigan.

“ 11. Finally, the object and claim of the foregoing paragraphs being to hold the waters of the Lake and River under the absolute control of the United States in the interest of navigation, it is expressly understood that said Company shall not be entitled to damages should the Government at any time or for any cause exercise its right to control and suspend the flow of water through the power canal, in the interest of navigation.

“ Witness my hand, this 12th day of December, 1902.

“ (Signed) ELIHU ROOT,

“ *Secretary of War.*

“ THIS INSTRUMENT is also executed by the Michigan Lake Superior Power Company by Francis H. Clergue, its President, thereunto lawfully authorized, this ninth day of December, 1902, in testimony of the acceptance by said Company of the foregoing conditions.

“ THE MICHIGAN LAKE SUPERIOR POWER COMPANY.

“ BY FRANCIS H. CLERGUE,

“ *President.*

“ Attest:

“ H. VON SCHON,

“ F. T. TREMPER.

“ (Seal)

“ OFFICE, CHIEF OF ENGINEERS, December 2, 1902

28614

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“ War Department.”

The plant of the Michigan Lake Superior Power Company has been designed to develop a portion of the power of the St. Marys Rapids.

To accomplish this end, water is diverted from the St. Marys River above the rapids into a canal running through the city of Sault Ste. Marie to a power house situated near the shore of St. Marys River, about 4,400 feet below the rapids, and is there returned to the river, after passing through turbines, which, together with electric generators, convert the hydraulic power into mechanical and electrical power. The plant is designed to develop about 45,000 horse-power at the turbine shafts, equivalent to about 42,000 electric horse-power at the switchboard in the power-house. Of this portion about 8,000 electric horse-power is now being utilized by the Union Carbide Company and Tran-Sault Ste. Marie Traction Company.

The plant consists of the canal, head gates, power house and power house equipment.

The canal consists of the intake, canal proper, fore-bay and tail-race. Its total length from the harbour line above the rapids to harbour line below the rapids is about 12,000 feet.

The head of the intake is located along the established United States harbour line, immediately west of the entrance to the United States ship canal, and its width along the harbour line is 990 feet, and its depth is 18 feet, so that the velocity of the water at the entrance will be, when the canal is operating at its

full capacity, about $1\frac{2}{3}$ cubic feet per second. The intake as it continues easterly, gradually narrows to a width of 204 feet, and deepens to a depth of 23 feet, below mean still water level at a point about 1,500 feet from the centre line of the entrance, thence continuous at the width given for a distance of about 900 feet to the head-gates. The sides of the intake are retained by rock-filled timber cribs with slopes of riprap paving above the water line.

The canal proper begins at the head gates, and for about 2,700 feet was excavated largely through sandstone bedrock to a width of about 200 feet, with substantially vertical walls. Where not excavated in rock the earth is retained by masonry retaining walls. Continuing east from the rock section, the canal extends for about 3,000 feet with rock bottom and timber-lined sides, and thence for another 3,000 feet through clay and sand, the bottom and sides both being timber-lined below the water line. The slopes above the water line are paved with rip rap. At the end of the clay section, the canal widens into a forebay, which delivers the water to the turbine chambers or penstocks in the power house. The water, after passing through the turbines into the tail pits, flows into the tail-race, the width of which is the full length of the power house, 1,340 feet, and thence is discharged into the River with a velocity of less than $1\frac{1}{2}$ feet per second.

In the forebay are located steel racks which collect floating wood, ice and other objects, and these divert such material through a wooden channel into a spillway, passing through the power house to the tail-race.

The power house is 1,340 feet long by 80 feet wide. Its foundation is a grillage of timber filled with concrete, resting on piles driven to bed rock. The substructure is divided by concrete walls into 81 tail pits, each one of 80 of which receives water from a turbine chamber or penstock immediately above it. The upstream ends of these tail pits are closed by segmental concrete arches and the roofs of the tail pits are monolithic concrete arches, which form the penstock and dynamo room floors. The superstructure has stone and concrete masonry walls with floors of steel and concrete, supported by steel columns, and is covered by a steel roof. The forebay side consists of 80 penstocks and one spilling way opening. These penstocks contain the turbines. They are $16\frac{1}{3}$ feet, centre to centre, 15 feet in width clear, and are closed on the downstream side by semi-cylindrical steel bulkheads, attached to steel and concrete partition walls. The penstocks take up about one-half of the first floor space. The first floor of the river side of the power house, which is just north of the penstocks, forms the dynamo room. The second and third floors in the power house are arranged for the location of machinery for manufacturing plants which now use, or may use, power generated by the plant.

At the west end of the power house is located a boiler plant of about 250 horse power capacity with centrifugal pumps for pumping, in the event of necessary repairs to the canal or power house, from the canal such water as will not drain by gravity into the tail race.

The equipment of the power house will be 80 penstock units, each consisting of two pairs of 33-inch horizontal turbines mounted on one shaft, which extends through the steel bulkheads into the dynamo room. To each turbine shaft there will be directly connected an electric generator of 375 to 400 K. W. capacity. There are at present installed 42 turbine units and 32 electric generators, 23 of the latter belonging to the Union Carbide Company, and nine to the Michigan Lake Superior Power Company. The capacity of each generator belonging to the Union Carbide Company is 375 K. W., and of each of the generators belonging to the Power Company 400 K. W.

The delivery of water into the power canal is controlled by head gates, located about 2,400 feet east of the intake entrance, at the beginning of the rock section of the canal. They consist of four Stonie steel sluice gates, operated between masonry piers by hand winches and suitable trains of gear. The piers,

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gate sills and abutments are all founded on rock. The gates are counter-balanced for ease in operating. The piers between the gates are spanned by steel and concrete arches, making a bridge with ample strength for either railroad or street purposes.

The mean difference in height between the upper and lower levels of St. Marys River is about 19.3 feet. It is estimated that when the canal is operating to its full capacity the loss in frictional, and other resistances to the flow of the water will be about 3 feet, making the mean effective head at the power house about 16 feet or a little over.

The total cost of the Michigan Lake Superior Power Company's plant to date is \$6,500,000.

6. THE WEST NEEBISH CHANNEL.

On Wednesday, the 15th, the sub-committee embarked again on board the steamship "Alfred Noble," kindly placed at their disposal by the office of the Corps of Engineers of the United States Army at the Soo, to visit the new double track channel which is now being constructed. This will be another road through Hay Lake and the West Neebish which will be completed in 1908.

Contract has been let for the construction of a channel 300 feet wide and 22 feet deep, for a distance of 13,300 feet through the rapids, with a stone retaining wall along each edge of the rock cut. About 6,000 lineal feet of the cut was to be enclosed by cofferdams and the included portion of the channel is excavated in the dry. These intermediate dams shut off all flow of water through the West Neebish. The upper and lower main dams were partially constructed by a dredge casting over excavated material consisting of gravel, sand or clay, and finished by depositing stones and gravel until the height of the dam was about six feet above the water surface. The construction of these two cofferdams was commenced in August, 1904, and finished in August, 1905.

The contractors, at the close of the year 1904, had also made good progress in other preliminary works in connection with the construction of this 300 foot channel through the West Neebish rapids, including roadways, framing of cable towers for the Telferage system, boarding houses, store, dock and assembling of plant.

By the construction of the two temporary cofferdams, the water was raised $\frac{3}{4}$ inches in pool above the upper dam. The contractors are employing, for the excavation of this solid rock bed, two air compressors of 750 and 250 horse-power respectively, and of 75 pounds pressure. The sides are first being channeled and a vertical retaining wall is being built along each side of the channel to a height of six feet above low water. Drilling is done with 16 drills, and 50 per cent. dynamite is used for blasting. The material is removed by four cableways, two of them 800 feet between the towers, and two of them 1,100 feet between the towers. The towers are 90 feet high. The skips used are steel, with dimensions of 8x8x2 $\frac{1}{2}$ feet. There is a steel shovel of 76 tons weight, which is used in loading skips, and two more shovels of 120 tons each are to be added next spring. The average working force is 150 labourers and 49 skilled mechanics and foremen. There were 1,586,000 cubic yards of rock to be excavated above 22 feet grade at the rate of \$1.36 per cubic yard, and 95,000 cubic yards between 22 and 23 feet grades are to be excavated at 68 cents per cubic yard. As above stated, this gigantic work was begun in May, 1904, and will probably be completed before the opening of navigation in the spring of 1908. That would make what we may call a double track channel of 300 feet from Sault Ste. Marie to Detour Point.

The mean level of Lake Superior for the years 1860 to 1904, both inclusive, is 602.29 feet above mean tide at New York. The discharge of the St. Marys River for this elevation of the lake, as measured in 1902, is 75,000 cubic feet per second. The increase in discharge per foot rise of lake is approximately 15,500 cubic feet per second.

The United States engineer of the War Department in charge at Sault Ste. Marie informed the sub-committee that they are now preparing a plan for a 25 foot channel, thus deepening the middle and west channels an additional four feet without further widening. The material which has been excavated from the St. Marys River is silt, sand, clay, gravel, stones, boulders, hard pan, sandstones and limestone bed rock. The dredging operations are all conducted under contracts. The inspectors of dredging are paid by the United States Government at the rate of \$85.00 per month and their board while employed during the working season. The total amount spent up to the present time by the United States Government in improving St. Marys River is as follows: canal, \$8,000,000, river channel, \$4,000,000; making a total of \$12,000,000.

Returning to the Soo in the afternoon, the Committee visited the plants and works of the Chandler-Dunbar Water-Power Company and those of the Edison Sault Electric Company.

7. THE CHANDLER-DUNBAR WATER-POWER COMPANY, AND THE EDISON SAULT ELECTRIC COMPANY.

The Chandler-Dunbar Water-Power Company was incorporated in virtue of the same Act which gave legal existence to the Michigan Lake Superior Power Company, viz.: Act, No. 39 of the Public Acts of the State of Michigan, to authorize the formation of a corporation for the purpose of excavating, constructing, and maintaining water courses with water-power appurtenant thereto, for accumulating, storing, conducting, selling, furnishing and supplying, upon an agreed rental, water and water-power for mining, milling, manufacturing, domestic, municipal, and agricultural purposes.

The Chandler-Dunbar Water-Power Company claim to have been for many years past, the owners of the south bank and shore of the St. Marys River at the rapids, in the city of Sault Ste. Marie, the County of Chippawa, in the State of Michigan, from a point 700 feet above and west of, to a point of 2,300 feet below and east of the south end of the International Bridge, across St. Marys River, and also of the bed of the St. Marys over and against said rapids extending from the south bank and shore of said river northerly to the international boundary line between the United States on one side and the Dominion of Canada on the other side; and extending from above the head of the falls in the St. Marys River nearly to the foot of the said Falls.

The volume of the flow in St. Marys River at the ordinary low water stage, at and past the land of the Chandler-Dunbar Water-Power Company, over and above the amount required for navigation, is, according to the engineer of the Company, about 3,600,000 cubic feet per minute, or 60,000 cubic feet per second. At higher stages the flow is naturally much more. There is, upon the lands of the Company, a fall of the water to the extent of about 12 feet, according to an estimate of the engineer of the Company.

The Chandler-Dunbar Water-Power Company claim that at least half of this flow of water is appurtenant to the American shore and appurtenant to the lands of the Company. It is, therefore, the intention of the Company and its lessee, the Edison Sault Electric Company, to take and use, where it passes the lands of the Company, for the production of available power all of such flow appurtenant to the said lands, excepting only such amount as may be required for navigation. The character of the proposed works is in each case a dam containing penstocks and wheels; the dam is designed to raise the level of water in the rapids, above the dam, to the level of Lake Superior, or as near as may be. The penstocks and wheels to have sufficient capacity to discharge and utilize all the flow of the rapids of the St. Marys River south of the international boundary. The penstocks will be provided with waste weirs for use when the wheels are to be stopped. The tail races will be excavated to as low a level as circumstances will permit in order that the entire available head may be utilized.

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The Chandler-Dunbar Water-Power Company are building their present works in virtue of certain permits which have been granted them by the United States War Office, and they also claim the ownership of what is generally called Island No. 1 and Island No. 2, in virtue of Letters Patent, granted them on the 15th of December, 1883. Said Letters Patent read as follows:—

“UNITED STATES OF AMERICA:

“To all to whom these presents shall come, Greeting:

“Special Act of Congress }
 “April 11, 1860. } WHEREAS, In pursuance of the Special Act
 “of Congress, approved April 11, 1860, entitled, ‘An Act for the relief of the legal
 “‘representatives of Charles Porterfield, deceased,’ there has been deposited
 “in the General Land Office, Warrant No. 123, for 40 acres in favor of William
 “Kinney and Thomas J. Michie, as executors of Robert Porterfield, deceased,
 “or their assignees, should any assignment from them as such executors, under
 “the provisions of the will of Robert Porterfield as directed by the Act in ques-
 “tion, be duly indorsed thereon, and, whereas there is indorsed on said warrant
 “an assignment duly executed in favor of William Chandler, with evidence
 “that the same has been duly located upon all that certain lot or parcel of land,
 “being a portion of section numbered six in township numbered forty-seven,
 “north of range numbered one, east of Michigan Meridian in the State of Mich-
 “igan, designated upon the official plan of the survey of the village of Sault Ste.
 “Marie, made by United States Deputy Surveyor Thomas Whelpley in 1854
 “and 1855, under and by virtue of an Act of Congress, approved September 26,
 “1850, entitled, ‘An Act providing for the examination and settlement of
 “‘claims for land at the Sault Ste. Marie, in Michigan,’ which survey was approved
 “by Leander Chapman, United States Surveyor-General for the State of Mich-
 “igan, September 4, 1855, and is now on file in the office of the Commissioner
 “of the General Land Office at Washington, D. C., as ‘part of the Indian Reser-
 “‘vation,’ said tracts being bounded by the River St. Mary on the east, north
 “and west, and by the St. Marys Falls Canal and Portage street extended on
 “the south, the same being more particularly described by courses and distance
 “as follows: Beginning at the intersection of the Principal Meridian of Michigan
 “with River St. Mary, being 90 links north of St. Mary’s Canal, and being the
 “north-west corner of north-east part of Claim No. 3; thence north 71 degrees,
 “39 feet east 4.00 chains; thence north 4 degrees, 37 feet west 3.65 chains to
 “the north-west corner of said tract, being the initial point of the survey of
 “said tract; thence south 4 degrees, 37 feet east 1.00 chains; thence south
 “77 degrees, 10 feet west 15.00 chains; thence north 85 degrees, 23 feet east
 “18.89 chains; thence north 18 degrees, 39 feet west 2.06 chains; thence north
 “80 degrees, 40 feet west 1.66 chains; thence south 88 degrees, 15 feet west
 “4.01 chains; thence north 84 degrees, 41 feet west 4.06 chains; thence south
 “85 degrees, 23 feet west 3.00 chains; thence north 89 degrees, 54 feet west
 “4.01 chains; thence south 79 degrees, 57 feet west 4.02 chains; thence north
 “69 degrees, 19 feet west 4.42 chains; thence south 87 degrees, 56 feet west 8.09
 “chains, to the initial point of survey; being the north-west corner of said tract
 “containing $9.10\frac{3}{4}$ acres of land, more or less, in the district of land subject to
 “sale at Marquette, Michigan, according to the Official Plat of the survey of
 “the said land returned to the General Land Office by the Surveyor-General.
 “Now know ye, that there is, therefore, granted by the United States unto the
 “said William Chandler the tract of the land above described, to have and to
 “hold the said tract of land with the appurtenance thereof, unto the said William
 “Chandler and to his heirs and assigns forever.

“In testimony whereof, I, Chester A. Arthur, President of the United

" States of America, have caused these Letters to be made Patent, and the seal
 " of the General Land Office to be hereunto affixed.

" Given under my hand at the City of Washington, the fifteenth day of
 " December, in the year of our Lord, one thousand eight hundred and eighty-
 " three, and of the independence of the United States the one hundred and
 " eighth.

" (Seal)

" United States General Land Office.

" By the President,

CHESTER A. ARTHUR.

" By

WM H. CROOK, *Secretary*.

" S. W. CLARK, Recorder of the General Land Office.

" Recorded, Vol. 6, Pages 1, 2 and 3."

8. THE REVOCABLE LICENSES GRANTED BY THE UNITED STATES WAR
 DEPARTMENT TO THE CHANDLER-DUNBAR WATER-POWER COMPANY
 OR TO ITS LESSEE, THE EDISON SAULT ELECTRIC COMPANY.

They are seven in number and read as follows by order of dates:

Revocable License No. 1 (March 14, 1889).

The Edison Sault Light and Power Company, of Sault Ste. Marie, a corporation existing under the laws of the State of Michigan, is hereby granted a license, revocable at will by the Secretary of War, to erect and maintain a dam on the rapids of the St. Marys River, between the mainland and Island No. 3, and within the limits of the lines marked "Proposed Embankment Dam," on the map hereto attached and made a part of this instrument, upon the following provisions and conditions:

1. That said dam shall be so constructed as not to interfere with private rights or public interests and improvements.

2. That the Engineer Officers of the United States Army, in charge of the district within which the dam is to be constructed may supervise its construction as far as may be necessary, to secure the compliance with the conditions herein obtained.

3. That any sum which may have to be expended, after revocation of this license, in putting any premises or property, hereby authorized to be occupied or used, in as good condition for use by the United States as it is this date, shall be repaid by said Edison Sault Light and Power Company on demand.

Witness my hand this fourteenth day of March, 1889.

(Signed) REDFIELD PROCTER,
Secretary of War.

This license, with the terms, provisions and conditions set out therein, is hereby accepted this fifth day of March, 1889.

THE EDISON SAULT LIGHT AND POWER COMPANY,

MR. C. E. AINSWORTH, *President*.

E. S. B. SUTTON, *Secretary*.

Signed in presence of J. H. Goff, W. Chandler, Chas. G. Clarke, Thomas J. Martin and Frank Perry, all of Sault Ste. Marie, Michigan.

Revocable License, No. 2 (August 8, 1892).

The Edison Sault Electric Company is hereby granted a license, revocable at will by the Secretary of War, to construct and to maintain an embankment dam in the St. Marys rapids, adjacent to its property at Sault Ste. Marie, Mich-

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igan, and extending into the river to a point half the distance from the shore to Islands Nos. 1 and 2, in accordance with the general plan shown on the map hereto attached, upon the following provisions and conditions:

1. That no portion of the dam, except that extending to Island No. 3 shall be so constructed as to extend further than midway between the Company's property and Islands Nos. 1 and 2

2. That the Engineer Officers of the United States Army, in charge of the district within which the dam is to be built, may supervise its construction as far as may be necessary to secure compliance with the conditions of this license.

3. That any sum which may have to be expended, after revocation of this license, in putting any premises or property, hereby authorized to be occupied or used, in as good condition for use by the United States as it is at this date, shall be repaid by said Edison Sault Electric Company on demand.

Witness my hand this nineteenth day of August, 1892.

(Signed) L. A. GRANT,
Acting Secretary of War.

This license, with the terms, provisions and conditions set out therein, is hereby accepted this eighth day of August, 1892.

(Signed) EDISON SAULT ELECTRIC COMPANY,
BY HARRIS T. DUNBAR, *President.*

Signed in the presence of F. E. Dunbar.
Engineer's Department, 1892, No. 3390.

6

Revocable License, No. 3 (July 8, 1893).

The Edison Sault Electric Company is hereby granted a license, revocable at will by the Secretary of War, to enter upon the land of the United States, forming part of the St. Marys Falls Canal grounds, at Sault Ste. Marie, Michigan, and to widen the tail race now in use by the said Company, between its power house and Island No. 3. from 15 to 25 feet; and to extend the small embankment dam, running down from Island No. 3 to Island No. 4, all as shown on the attached plat of a part of the canal grounds, the red lines on the plat showing the extent of the proposed work, upon the following provisions and conditions:

1. That unless sooner revoked, this license shall expire at the end of five years from the date of its execution.

2. That the excavated material shall not be removed, but it shall be deposited back (south) of its present position.

3. That any sum which may have to be expended, after revocation of this license, in putting any premises or property, hereby authorized to be occupied or used, in as good condition for use by the United States as it is at this date, shall be repaid by said Edison Sault Electric Company on demand.

Witness my hand this sixth day of July, 1893.

(Signed) L. A. GRANT,
Acting Secretary of War.

Office, Chief of Engineers, United States of America, Inclosure 2 of 3,081.

Received, Office Chief of Engineers, July 8, 1893.

Revocable License No. 4 (April 4, 1902).

WHEREAS, By revocable license, dated August 13, 1892, the Acting Secretary of War gave unto the Edison Sault Electric Company permission to construct and maintain an embankment dam in the St. Marys River Rapids, adjacent to its property at Sault Ste. Marie, Michigan, and extending into the river to a point half the distance from the shore to Islands Nos. 1 and 2, in accordance with the general plan shown on the map thereto attached, and subject to the conditions therein contained;

AND WHEREAS, Said Edison Sault Electric Company has now applied to the Secretary of War for a modification of said license of August 13, 1892, so as to permit the construction of the proposed new power station indicated at A-A' on the attached blue-print, and to extend the present embankment, as indicated by the heavy white line from *a* to *c*, and remove the red lined section *a, b*; also to make a new tail race outside of Island No. 3, at said place, all as shown on the attached blue print;

NOW, THEREFORE, This is to certify that the Secretary of War hereby modifies said revocable licenses of August 13, 1892, so as to permit the construction of a proposed new power station, indicated at A-A' on the attached blue print, and to extend the present embankment, as indicated by the heavy white line from *a* to *b*, and to remove the red line section *a b*, shown on said blue print; also gives unto said Company permission to make a new tail race outside of Island No. 3, at said place, as shown on said blue print, subject to the following conditions:

1. That this permission shall not be construed as authorizing any invasion or impairment of the riparian rights of any other person or corporation, and the right to withdraw the permission for use of this tail race whenever the interests of the Government so requires, is expressly reserved.

2. That the work of cleaning and deepening the tail race shall conform to the plan outlined in the Company's letter of March 23, 1901, a copy of which is hereto attached.

3. That as soon as the new tail race is ready for use said Company shall abandon the tail race now used on the inside of Island No. 3, and relinquish to the United States all rights of the Company between said Island and the shore.

4. That the work herein permitted to be done shall be subject to the supervision and approval of the Engineer Officer of the United States Army in charge of the locality.

5. That any sum which may have to be expended, after revocation of this license, in putting any premises or property, hereby authorized to be occupied or used, in as good condition for use by the United States as it is at this date, shall be repaid by said Edison Sault Electric Company on demand.

Witness my hand this fourth day of April, 1901.

(Signed) ELIHU ROOT,
Secretary of War.

Office, Chief of Engineers, War Department, April 6, 1901, No. 38452.

14

The following letter is annexed to the preceding license, and forms part of the official records of the War Department in Washington:—

THE SHOREHAM,
WASHINGTON, D. C., March 23, 1901.

HONOURABLE SECRETARY OF WAR, Washington, D. C.:

SIR,—In addition to the plan of the proposed tail-race, for which we are making application to improve, and to which this is attached and made a part,

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We would state that it is our desire to clear out the driftwood, loose boulders, rock and such other material as may be encountered, to a depth of not exceeding 10 feet below the present surface; this at a point where the property of our Company on the east intersects with that of the Government, and on the lines indicated by the plan herein referred to.

From this as a grade starting point, we wish to extend the improvement downstream on the lines indicated by our plan, gradually decreasing the depth of excavation as the slope of the bottom requires, until a plane is reached when no further excavation would be required, the natural surface and improved channel being on the same grade, at a point not lower down the channel than the westerly extremity of Island No. 5.

It is not intended or requested on our part to make any permanent embankments on either side of the excavation so applied for unless required by the Government.

It is not expected on our part that after completing the improvements herein contemplated that we will change the volume of flow of water on the Government property, which we now seek to utilize. It is hoped on our part to pass the same amount of water over the same areas as would naturally flow, concentrating its fall at a given point and utilizing it for commercial purposes, instead of as at present the fall is diffused over a long distance and goes to waste.

Very respectfully,

EDISON SAULT ELECTRIC.

Revocable License, No. 5 (June 9, 1902).

The Chandler-Dunbar Water-Power Company, Sault Ste. Marie, Michigan, is hereby granted a license, revocable at will by the Secretary of War, to occupy, for the purposes of the extension of said Company's dock, a small area of land belonging to the United States Government at Sault Ste. Marie, Michigan, as shown by red lines on the attached drawing, upon the following provisions and conditions:

1. That the United States shall have a perpetual right to the free use of said dock in the future, so far as needed for government work connected with future canal operations and improvements, as Sault Ste. Marie, Michigan.

2. That any sum which may have to be expended, after revocation of this license, in putting any premises or property, hereby authorized to be occupied or used, in as good condition for use by the United States as it is at this date, shall be repaid by said Chandler-Dunbar Water-Power Company on demand.

Witness my hand this ninth day of June, 1902.

(Signed) WM. CARY SANGER,

Assistant Secretary of War

Office, Chief of Engineers, War Department, June 10, 1902, No. 42721.

Revocable License, No. 6 (March 10, 1904).

WHEREAS, By revocable license, dated August 13, 1892, the Acting Secretary of War gave unto The Edison Sault Electric Company permission to construct and maintain an embankment dam, in the St. Marys River rapids, adjacent to its property at Sault Ste. Marie, Michigan, and extending into the river to a point half the distance from the shore to Islands Nos. 1 and 2, in accord-

ance with the general plan shown on map hereto attached, and subject to the conditions therein contained;

AND WHEREAS, By an instrument dated April 4, 1901, the Secretary of War modified said revocable license of August 13, 1892, so as to permit the construction of a proposed new power station, indicated at A-A¹ on the blue print hereto attached, and to extend the embankment, as indicated by the heavy white line from *a* to *c*, and to remove the red line section *a b*, as shown on said blue print; and also gave unto said Company permission to make a new tail race outside of Island No. 3, at said place, as shown on said blue print, subject to the conditions therein contained;

AND WHEREAS, Said Edison Sault Electric Company has now applied to the Secretary of War for a modification of said permit of April 4, 1901, as hereinafter specified, so as to allow it to build further out into the rapids of the St. Marys River, in front of the shore properties owned or leased by said Company;

NOW, THEREFORE, This is to certify that, in accordance with the recommendation of the Chief of Engineers, the Secretary of War hereby modifies said instrument of April 4, 1901, so as to permit said Company to build further out into the rapids of the St. Marys River, at said place; the work herein authorized being shown on the attached blue print, and specifically described by reference thereto, as follows:

1. The removal of the wall and buildings (abB), colored red.
2. The substitution of a somewhat larger power house (EE) and a longer wall (a d), colored yellow, in place of the already authorized power house (AA¹) and wall (ac¹)) colored white.
3. The construction of a wider tail-race (G. G¹) below the power house, of width suited to the latter, in lieu of the old tail race (f f¹).

These modifications are made on the following conditions:

1. That this permission shall not be construed as authorizing any invasion or impairment of the riparian rights of any other person or corporation, and the right to withdraw the permission for use of this tail race whenever the interests of the Government so require, is expressly reserved.

2. That the work of clearing and deepening the tail race shall conform to the plan outlined in said Company's letter of March 23, 1901, a copy of which is hereto attached.

3. That as soon as the new tail race is ready for use, said Company shall abandon the tail race now used on the inside of Island No. 3, and relinquish to the United States all rights of the Company between said Islands and the shore.

4. That the work herein permitted to be done shall be subject to the supervision and approval of the Engineer Officer of the United States Army in charge of the locality.

5. That any sum which may have to be expended, after revocation of this license, in putting any premises or property, hereby authorized to be occupied or used, in as good condition for use by the United States as it is at this date, shall be repaid by said Edison Sault Electric Company on demand.

6. That the area now occupied by the old buildings and old tail race shall be abandoned to the United States, as soon as the new buildings and new tail race can reasonably be completed and ready for service.

Witness my hand this tenth day of March, 1904.

(Signed) WM. CARY SANGER,

Acting Secretary of War.

Office, Chief of Engineers, War Department, March 13, 1904, No. 38452.

The following letter is annexed to the present patent, and forms part of the official records of the War Department in Washington:—

THE SHOREHAM,

WASHINGTON D. C., March 23, 1901.

HONOURABLE SECRETARY OF WAR, Washington, D. C.:

SIR,—In addition to the plan of the proposed tail race, for which we are making application to improve, and to which this is attached and made a part,

We would state that it is our desire to clear out the driftwood, loose boulders, rock and such other material as may be encountered, to a depth of not exceeding 10 feet below the present surface; this at a point where the property of our Company on the east intersects with that of the Government, and on the lines indicated by the plan herein referred to.

From this as a grade starting point, we wish to extend the improvement downstream on the lines indicated by our plan, gradually decreasing the depth of excavation as the slope of the bottom requires, until a plane is reached where no further excavation would require, the natural surface and improved channel being on the same grade not lower down the channel than the westerly extremity of Island No. 5.

It is not intended or requested on our part to make any permanent embankment on either side of the excavation so applied for unless required by the Government.

It is not expected on our part, after contemplating the improvements herein contemplated, that we will change the volume or flow of water over the Government property which we now seek to utilize. It is hoped on our part to pass the same amount of water over the same area as would naturally flow, concentrating its fall at a given point and utilizing it for commercial purposes, instead of as at present the fall is diffused over a long distance and goes to waste.

Very respectfully,

EDISON SAULT ELECTRIC COMPANY.

WAR DEPARTMENT,

WASHINGTON, July 30, 1903.

GENTLEMEN,—Referring to previous correspondence concerning the suspension of the permission heretofore granted the Edison Sault Electric Company, to build its embankment dam, power house and other works farther out into the St. Marys River rapids at Sault Ste. Marie, Michigan, I beg to inform you that I have this day executed an instrument modifying the permit of March 10, 1903, granting the permission above referred to, so as to have thereto the following conditions:

“That no part of the proposed embankment dam, power house and other works shall be so constructed as to extend farther into the River than one-half of the distance from shore to the nearer island of Islands Nos. 1 and 2.

“That the present rock bottom in the river at the head of the rapids and head of the head race shall not be cut away or otherwise lowered or deepened.”

Very respectfully,

(Signed) ELIHU ROOT,

Secretary of War.

MESSRS. SHAW, WARREN, CADY & OAKES,

Attorneys for St. Marys Power Company, Detroit, Mich.

OFFICE OF CHIEF OF ENGINEERS,

December 23, 1903.

NOTE:—

Paragraph 7 of the Notice of July 30, 1903, modified as follows: (See 17th ind. on 46393, and ind. of Acting Secretary of War, October 31, 1903, on 46393), viz.:

“7. That no part of the proposed embankment dam, power house and other works, shall be constructed above a line extending from the foot of Island No. 2 at right angles to the general course of the channel between said Island and the shore, so as to extend farther into the river than one half of the distance from the shore to the nearer island of Islands Nos. 1 and 2; and that around the foot of Island No. 2, such construction shall leave at all stages of water a free water flow, at least equal in total cross section and volume to that now passing between Islands Nos. 1 and 2, and the nearest parts of the embankment of the August 13, 1892, permit.”

Revocable License, No. 7 (May 8, 1905).

WHEREAS, By instrument dated March 10, 1903, as subsequently modified by instrument dated July 30, 1903, permission was granted by the Secretary of War to the Edison Sault Electric Company, to construct an embankment dam, power house and accessory works in the St. Marys River at Sault Ste. Marie, Michigan, as specifically described in said instrument of March 10, 1903, and shown on the map attached thereto; such permission, however, being subject to the conditions set forth in said instrument of March 10, 1903, as modified by said instrument of July 30, 1903;

AND WHEREAS, Application is now made by said Edison Sault Electric Company for permission to make certain alterations in the proposed work and certain additional constructions in connection therewith; and the Chief of Engineers, United States Army, has recommended that permission be given to the extent hereinafter set forth;

NOW, THEREFORE, This is to certify that the Secretary of War hereby gives the said Edison Sault Electric Company permission for the construction of a temporary sand-bag cofferdam, as indicated in red on the attached blue print, and described by reference thereto as extending from the point G to Island No. 1, between Islands Nos. 1 and 2, and from Island No. 2 to the point F.

This permission, however, is given upon the following conditions:

1. That the said temporary sand-bag cofferdam shall be entirely removed by said Company not later than the close of navigation of the calendar year, 1905.
2. That the work herein permitted and required to be done shall be subject to the supervision and approval of the Engineer Officer of the United States Army in charge of the locality.

Witness my hand this eighth day of May, 1905.

(Signed) WM. H. TAFT.

Secretary of War.

Office of Chief of Engineer, War Department, May 15, 1905, No. 38452.

The United States Government has entered a suit in the Circuit Court of the United States for the Western District of Michigan, Northern Division, against the Chandler-Dunbar Water-Power Company, claiming the ownership

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of Island No. 1 and Island No. 2, and asking that the letters patent granted them in 1883 be cancelled and declared void. The suit was commenced by the United States, under the direction of the Attorney-General, on September 2, 1903. All testimony and records and documentary evidence have been taken, and the case was heard last spring, and judgment was given on July 20th last, by Mr. Justice P. Wanty, dismissing the action of the United States Government and maintaining the Chandler-Dunbar Water-Power Company in their act of ownership to Islands Nos. 1 and 2.

The United States, as complainant, claims that it is the owner of Islands Nos. 1 and 2, situated in the rapids of the Straits of St. Mary, north of the ship canal and locks belonging to it; that said Islands are situated in public waters, to which no riparian rights can be attached, and that the continued undisturbed ownership and possession thereof is essential to the present and future operation and enlargement of said works in aid of commerce, and also essential to enable the United States to fulfil its international obligations to Great Britain, by maintaining the communicating waterways of the Great Lakes as public waters.

The defendant denies the public character of the waters in which said Islands are situated, and asserts that the ownership of said Islands attaches to the ownership of the adjacent shore title on the American side. The defendant also denies that said Islands are needed by the United States for public purposes, and denies that their ownership and possession are essential to the performance of the international obligations of complainant.

The defendant claims to be the owner of said Islands by virtue of a Patent, issued on December 15, 1883, to its grantor, William Chandler, asserting that said title attaches also to said Islands by virtue of its alleged riparian ownership.

The complainant claims that said Islands, together with a quantity of land on the south shore of the Straits, on a part of which a ship canal and locks are constructed and in operation, have been reserved since the year 1882, and at any rate since April 3 and September 2, 1847, for public purposes.

The defendant, while admitting such reservation in 1847, claims that said reservation has been released:

- (a) By order of the President on December 9, 1852;
- (b) By the abandonment of an Indian right of occupancy by a treaty, proclaimed April 24, 1856;
- (c) By the Act of September 26, 1850, and the operations thereunder, such operations including the survey of the mainland at Sault Ste. Marie, by Thomas Whepley in 1854 and 1855.

The complainant alleges that the tract patented to Chandler was not included in the Whepley survey and was never included in any other survey of the public lands, and that, therefore, the land was not subject to be taken by location with Porterfield Scrip, which is the basis of the Chandler title, under the very terms of the Act of Congress authorizing the use of such scrip.

The defendant alleges that this suit is not brought in good faith by the United States, but that its object, instead of being the assertion of the rights and duties set out in complainant's bill, is to assist a private corporation, the Michigan Lake Superior Power Company, to divert water from flowing past the land covered by defendant's alleged title.

The complainant insists that this suit is brought in good faith, for the objects and purposes set out in its bill.

The defendant also relies upon the Statute of Limitations of March 3, 1891, which provides that suit by the United States to vacate and annul any patent theretofore issued, shall only be brought within five years from said date.

The complainant insists that the patent issued to Chandler in 1883 was not voidable, but absolutely void, because the land embraced therein, being in a state of reservation, was not subject to disposal under the public land laws of the United States, and that a void title is not within the intent of said Statute

of Limitations; and complainant insists, further, that said Statute of Limitations does not apply, because said title is also void for the reason that the land covered by said patent has never been surveyed into legal sub-divisions, or at all, and was not, therefore, subject to a location by Porterfield scrip.

The defendant also alleges that the complainant is estopped by its dealings with the defendant and by its laches to deny the title of defendant to the upland alleged to be embraced in the patent to defendant's grantor.

As above stated, Judge Wanty maintained the plea of the Chandler-Dunbar Water-Power Company in the Circuit Court of the United States for the Western District of Michigan, Northern Division. The Attorney-General has appealed from that judgment to a higher court, and the question has not yet been argued.

9. THE CONSOLIDATED LAKE SUPERIOR POWER COMPANY.

On Thursday the Committee again embarked on board the United States Government Steamer, "Alfred Noble," and went to the Canadian side to visit the plants of the Consolidated Lake Superior Power Company. This Company was incorporated under the Revised Statutes of Ontario, Ch. 164, as the Sault Ste. Marie Water, Gas and Light Company, on June 30, 1888. By Ch. 88, of the Ontario Statutes, 1889, the Company's name was changed to "The Ontario Water, Light and Power Company." By Section 4 of this Act, the Company obtained the power to build dams across the island channels or rapids of the St. Marys River or of any branch within the Province of Ontario, and also to conduct water from the said river and the various branches thereof for hydraulic purposes; also to make flumes, canals or other works to secure the necessary supply of water for their works. The provisions of the section were to be exercised only with the consent of the Crown or the individuals affected. The Company was also authorized to sell, lease or otherwise dispose of surplus water from their dams, flumes or canals. By the Ontario Act of 1890, Ch. 135, the corporation of Sault Ste. Marie was authorized to take stock in the Ontario and Sault Ste. Marie Water, Light and Power Company, and an agreement with this view was ratified and is annexed to Ch. 135, above described.

By the Ontario Act of 1895, the name of the Company was changed into "The Lake Superior Power Company," all rights, powers and privileges to be enjoyed as theretofore granted. The St. Marys Island, containing an area of 170 acres, was part of the military lands, expressly vested in the Crown for the purposes of the Province of Canada by the Act 19, Vic., Chap. 45, Section 6 (1856). The northerly portion, comprising 10.10 acres of St. Marys Island, which belonged to the Dominion as ordinance lands, was granted by way of exchange of properties to the Lake Superior Power Company by Dominion Letters Patent, dated March 19, 1896. They covered the said parcel of land and land covered with water, being a portion of St. Marys Island and the adjacent waters, and reserved the free use of all navigable waters that might thereafter be found on, under, or flowing through, or upon any part of the land. These Letters Patent read as follows:—

"Special grant by Her Majesty the Queen to the Lake Superior Power Company, of parcel or tract of land and land covered by water, being a portion of the St. Marys Island and the adjacent waters, being in the town of Sault Ste Marie, in the District of Algoma, Ontario, dated March 18, 1896, recorded March 19, 1896.

"J. POPE,

"*Acting Deputy Registrar-General of Canada.*

"JOHN J. McGEE,

"*Deputy Governor.*

"CANADA:

"Victoria, by the Grace of God, of the
"United Kingdom of Great Britain and
"Ireland, Queen, Defender of the Faith,
"etc., etc., etc.

"To all these presents shall come, Greeting:

"WHEREAS the lands hereinafter described have been required for a
"public work of Canada, and the same are no longer required for such public
"work;

"AND WHEREAS, Pursuant to the Statutes and under the authority of
"our Governor-in-Council in that behalf, we have agreed to grant the said
"lands to the Lake Superior Power Company, hereinafter called 'the said
"Company,' in exchange for certain other lands, situated at the town of Sault
"Ste. Marie, in the Province of Ontario, and the said last mentioned lands
"have been duly conveyed to us by 'the said Company.'

"NOW KNOW YE, That in consideration of the premises, we do grant,
"convey and assure unto 'the said Company' all and singular that certain parcel
"or tract of land and land covered by water, being a portion of St. Marys Island
"and the adjacent waters, situated, lying and being in the town of Sault Ste.
"Marie, in the District of Algoma, and Province of Ontario, and which may be
"more particularly known and described as that portion of St. Marys Island
"and adjacent waters, the property of the Government of the Dominion of
"Canada, lying to the north of a straight line to be hereinafter described, and
"bounded on the west by the southerly production of the easterly limit of
"West Street, and on the east by the Laird & Henderson mill site (a tract of
"12 acres, granted by Letters Patent, dated June 7, 1877, to John Laird and
"Jonathan Henderson); the above mentioned straight line is drawn from a
"point on the southerly production of the easterly limit of West Street, distant
"one thousand one hundred and forty nine and four-tenths (1,149 4-10) feet,
"measured southerly along said production from the southerly limit of Portage
"Street, to a point on the southerly production of the westerly limit of Andrew
"Street, distant nine hundred and thirty-six and four-tenths (936 4-10) feet,
"measured southerly along said production from the said southerly limit of
"Portage Street; the above described parcel contains by admeasurement ten and
"ten hundredths (10.10) acres, be the same more or less, and is shown colored
"pink on a plan hereto annexed, saving, excepting and reserving unto us, our
"successors, and assigns the free uses, passage and enjoyment of, in, over and
"upon all navigable waters that shall or may be hereafter found on, or under,
"or be flowing through, or upon any part of the said parcel or tract of land
"hereby granted as aforesaid.

"TO HAVE AND TO HOLD the said parcel or tract of land unto 'the
"said Company,' its successors and assigns forever.

"GIVEN under the Great Seal of Canada:

"WITNESS: John Joseph McGee, Esquire, Deputy of Our Right Trusty
"and Right Well Beloved Cousin and Councillor the Right Honourable Sir
"John Campbell Hamilton Gordon, Earl of Aberdeen, Viscount Formartine,
"Baron Haddo, Methlic, Tarves and Kellie, in the Peerage of Scotland; Viscount
"Gordon of Aberdeen, County of Aberdeen, in the Peerage of the United King-
"dom, Baronet of Nova Scotia, Knight Grand Cross of our Most Distinguished
"Order of Saint Michael and Saint George, etc., etc., Governor-General of
"Canada.

"(E. L. Newcombe, Deputy of the Minister of Justice, Canada.)

"At our Government House, in our City of Ottawa, this eighteenth day

“ of March, in the year of Our Lord, one thousand eight hundred and ninety-six,
 “ and in the fifty-ninth year of our Reign.

“JOHN HAGGART, •

“BY COMMAND:

“JOSEPH POPE,

“*Acting Under Secretary of State.*”

“*Minister of Railways and Canals.*

The Lake Superior Power Company are at present the owners of the Laird & Henderson mill site, which comprised a certain area of water and islands therein north of St. Marys Island. This mill site had been granted by Letters Patent from the Province of Ontario on June 7, 1877, to John Laird and Jonathan Henderson. Said Letters Patent read as follows:—

“D. A. MACDONALD,

“PROVINCE OF ONTARIO,”

“VICTORIA, by the Grace of God of the
 “United Kingdom of Great Britain and
 “Ireland, Queen, Defender of the Faith.

“To all to which these presents shall come, Greeting:

“WHEREAS, John Laird, of the town of Sault Ste. Marie in the District
 “ of Algoma, Miller, and Jonathan Henderson, of the same place, Merchant,
 “ have contracted and agreed for the absolute purchase of the lands and tene-
 “ ments hereinafter mentioned and described at and for the price of or the sum
 “ of twelve dollars of lawful money of Canada, and of which lands we are
 “ seized in right of our Crown.

“NOW KNOW YE, That in consideration of the said sum of twelve dollars
 “ well and truly paid to our use, at or before the sealing of these, our Letters
 “ Patent, we have granted, sold, aliened, converted and assured, and by these
 “ presents do grant, sell, alien, convey and assure unto the said John Laird and
 “ Jonathan Henderson, their heirs and assigns forever.

“All that parcel or tract of land and land covered with water, situate, lying
 “ and being at the town of Sault Ste. Marie in the District of Algoma, in the
 “ Province of Ontario, containing by admeasurement twelve acres, be there
 “ more or less, which said parcel or tract of land may be otherwise known as
 “ follows, that is to say: Being composed of a mill site at the town of Sault Ste.
 “ Marie, in front of the Township of Avenge, as shown by the green colour on a
 “ plan by Provincial Land Surveyor, Isaac Traynor, dated May 5, 1877, of record
 “ in the Department of Crown Lands, a copy of part of which plan is attached
 “ to these Letters Patent, together with the right of way one chain wide
 “ from the said mill site to the Korah Road, as shown on the said plan by
 “ the red colour.

“TO HAVE AND TO HOLD the said parcel or tract of land hereby granted,
 “ conveyed, assured unto the said John Laird and Jonathan Henderson, their
 “ heirs and assigns for ever, saving, excepting, and reserving, nevertheless,
 “ unto us, our heirs and successors, the free uses, passage and enjoyment of, in,
 “ over and upon all navigable waters that shall or may be hereafter found on, or
 “ under, or be flowing through, or upon any part of the said parcel or tract of
 “ land hereby granted as aforesaid.

“GIVEN under the Great Seal of our Province of Ontario.

“WITNESS, The Honourable Donald Alexander MacDonald, Lieutenant-
 “Governor of our Province of Ontario;

“AT TORONTO, This seventh day of June in the year of Our Lord, one

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“ thousand eight hundred and seventy seven, and in the fortieth year of our
“ Reign.

“BY COMMAND of the Lieutenant-Governor-in-Council.

“ARTHUR S. HARDY, C. L. S.,
“ *Secretary.*

“THOMAS H. JOHNSTON,
“ *Assistant Commissioner of Crown Lands.*

“ Ref. 41, 125; Toronto, 37, 551; F. D. W. F.”

The Lake Superior Power Company also acquired from H. C. Hamilton and his wife a piece of land adjacent to the Laird and Henderson mill site, by a deed, executed on June 30, 1890, and duly registered at the Registry Office of the District of Algoma, in the town of Sault Ste. Marie, Ontario.

The present industrial activity and development at the Soo may be said to date from October, 1894, when an agreement was entered into between Francis H. Clergue, of New York city, and Edward V. Douglas, of Philadelphia, for the purchase of the Ontario and Sault Ste. Marie Water, Light and Power Company. This Company was originally formed for the development of power from the falls of the St. Marys River on the Canadian side, but after doing a certain amount of work, including the partial construction of a power canal, found itself financially embarrassed and unable to properly proceed with the completion of the work so that a revenue could be derived from it. The town of Sault Ste. Marie was practically the owner of the Company, only a part of the capital stock being held by individuals. The Company, in addition to their power privileges, were also the owners of franchises from the town of Sault Ste. Marie, for electric lighting, water and street railway privileges. The transactions of Messrs. Clergue and Douglass are a matter of public record, and can be found in Chapter 119 of the Statutes of Ontario for the year 1895. Under this Act, which was assented to April 16, 1895, Mr. Clergue and his associates took over the complete property and franchises of the Ontario and Sault Ste. Marie Water, Light and Power Company. The name of the Company at the same time being changed to the Lake Superior Power Company.

The Tagona Water and Light Company had already been organized in October of 1894 by Messrs. Clergue and Douglass, and its incorporation was confirmed by the same Act above referred to. This Company was assigned the water and lighting privileges in the town of Sault Ste. Marie, and subsequently installed and are now operating an up-to-date water and lighting system.

The new Company, viz., The Lake Superior Power Company, which was composed of Mr. Clergue and his associates, immediately commenced the development of water-power on the Canadian side of the St. Marys Falls. They utilized, as far as possible, the old power canal but increased its size to provide for much larger development of power, and constructed a suitable power house for the development of electrical power from the water wheels, in which the Tagona Water and Light Company were provided with a pumping and lighting station.

The Sault Ste. Marie Pulp and Power Company was also provided with mill accommodation in the same group of buildings. These buildings are of solid stone construction and of modern type, Lake Superior limestone being used, quarried from the Company's own property. This Company was incorporated in 1895, and was an allied Company of the two others above mentioned, the promoters being the same. It was first planned to make mechanically

ground wood pulp under the wet process, but, after manufacturing wet pulp for a time the mill was changed to make dry pulp, and has been operating under this process ever since. The manufacture of pulp marked the commencement of Sault Ste. Marie as a manufacturing town, and consequently a new area of activity.

The promoters of the Company mentioned above, realizing the vast natural resources of the district, rapidly proceeded with the inauguration and incorporation of various new industrial and transportation companies, a brief description of which follows. The town and district naturally profited greatly from these developments, entailing as they did the expenditure of vast sums of money for labour and material in their midst.

The Lake Superior Power Company did not confine itself to the development of power alone, but early began the exploration of the surrounding districts for minerals, and met with such success, with respect to iron and nickel finds, as to warrant the construction of plants for the treatment of these ores. Blast furnaces for the smelting of iron ores and a steel rail mill were built, together with operatives' houses; and for the utilization of the hardwoods of the district contiguous to the Soo a charcoal by-product plant and kilns were constructed. The charcoal from these plants was used in one of the blast furnaces. A reduction work was built for the treatment of nickel ore, one of the features of this process being the saving of the sulphurous gas for use in the manufacture of sulphite pulp. This Company was meanwhile successfully operating the Helen Iron Mine and the Gertrude Nickel Mine.

The blast furnaces, steel plant and charcoal plant were originally constructed by the Lake Superior Power Company, but in the year 1901 were turned over to the Algoma Steel Company.

The Lake Superior Power Company had also become the owner by purchase, of large areas of real estate in and around Sault Ste. Marie, and particularly on the river front, where it built docks, and otherwise held the land to provide for the expansion of itself and the other allied Companies.

The Sault Ste. Marie Pulp and Paper Company built in addition to its Ground Wood Pulp Mill a large and handsome sulphite mill, and also commenced the manufacture of building paper and tar paper.

With so much construction and operation going on it was soon found necessary to have a workshop of sufficient capacity to take care of all repairs and a great part of new work. This was started on a comparatively small scale, but the demands upon it were so large that it was later found essential to extend it. This was done from time to time, until finally the Algoma Iron Works was formed, and a splendid modern machine shop with galleries for small work constructed, modern machinery sufficient to do the repairs of all the different departments of the various companies being installed. The blacksmith and tin shop were also added, and an up-to-date foundry for casting iron, brass and copper was built. These are all operating at the present time. This concern not only does repairs for the various companies but it also handles a great deal of outside work, including marine repairs, of which work it makes a specialty.

Railroad facilities were naturally required to provide for handling ores from the mines and forest products, as well as switching at the various plants, and the Algoma Central Railroad was incorporated August 11, 1901, to serve this purpose, and in addition to a railroad of 120 miles, it owns and operates a fleet of vessels trading out of Sault Ste. Marie, consisting of four passenger boats and six freight boats. As part of the transportation plant of the Company, The Manitoulin and North Shore Railway was incorporated July 7, 1901. Both of these railroads were the recipients of land grants from the Ontario Government, the conditions of which can be obtained in the Statutes.

The construction of these transportation lines was carried on by the Algoma Commercial Company, formed for this purpose, as well as for the purpose of

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carrying on mining and lumbering operations, the latter operation including the supply of pulp wood through the mill of the Pulp Company, and that of saw logs and veneer logs to its own saw and veneer mills at the Soo, the saw mill having a daily capacity of 100,000 feet, and the veneer mill being the largest in Canada. This Company also built a car building plant at the Soo with a capacity of eight flats or four box cars per day. It further made extensive explorations for minerals, including iron, nickel and gold. The Company owns at present the Josephine Mine, which is a bessemer iron mine, the Grace Gold Mine and the Elsie Nickel Mine.

The right to operate street car lines had also been granted to the companies under the original franchise, and the International Transit Company was formed for the purpose of operating electric street car lines in the town of Sault Ste. Marie, Ontario, and also a ferry on St. Marys River between the two Soos. An up-to-date electric railroad was constructed and is at present operating. The equipment of the Company also includes two ferries, the "Algoma" and the "Fortune." These are modern ferry boats and have sufficient capacity to easily handle the traffic.

In the year 1901, the various companies were consolidated under the ownership of the Consolidated Lake Superior Company. The individual companies were made subsidiary to this Company in that the Consolidated was a holding Company and owned the stock of the various companies, the companies, however, preserving in every way their corporate existence. The subsidiary companies were reorganized in the year 1904 under the title of the Lake Superior Corporation, which at present is the holding Company.

Before the advent of these companies the town of Sault Ste. Marie had a population of 2,000. There were no factories of any kind in the place, and the community did a very small business except a certain amount of trading. The construction of the large factories of the allied companies immediately gave a great impetus to the town. The population has steadily increased, until at the present time it is estimated that the population is 15,000. The works and properties of the allied companies cover an acreage of 1,600 and a total of about 4,000 men find employment. The town is in a prosperous condition, and is certain to become one of the great manufacturing centres of the country.

The following is a list of the various companies with the different plants operated by each, together with the number of men employed:—

Tagona Water and Light Company—

Municipal system of electric lighting and water supply; employs twenty men; eighty-eight miles of electric wire; twenty miles of water main.

Lake Superior Power Company—

Owners of the Canadian Power Plant; nickel reduction works; Gertrude Nickel Mine and smelter; brick plant; large acreage real estate; Helen Iron Mine; two hundred and twenty-five men employed.

Sault Ste. Marie Pulp and Paper Company—

Ground Wood Mill, 110 tons daily capacity; Sulphite Pulp Mill—50 tons daily capacity; Building Paper and Tar Paper Mill, 20 tons daily capacity; one hundred and seventy-five men employed.

Algoma Iron Works—

Large modern machine shop, blacksmith shop, tinsmith shop, pattern shop, brass, iron and copper foundry; employs one hundred and fifty men.

Algoma Steel Company—

Two blast furnaces, daily combined capacity 450 tons; steel plant, 600 tons steel rails daily capacity; charcoal retort plant, daily capacity 8,000 bushels

charcoal, 1,600 gallons wood alcohol, 24,000 pounds gray acetate of lime; thirteen hundred men employed.

Algoma Central and Hudson Bay Railway Company—

One hundred and twenty miles of standard railroad under operation, fully equipped with modern rolling stock; steamship line consists of four passenger and six freight boats, also operates four docks; three hundred and fifty men employed.

Manitoulin and North Shore Railway Company—

Thirteen miles of standard railroad under operation, fully equipped with modern rolling stock, operated between Sudbury and Gertrude Mine; thirty men employed.

International Transit Company—

Operates standard electric street car line in the town of Sault Ste. Marie, Ontario, providing eight minute service; also operates ferry service between two Soos, owns two ferries; fifty men employed.

Algoma Commercial Company—

Operates saw mill, daily capacity 100,000 feet lumber; veneer mill, largest in Canada; car building plant, capacity eight flats or four box cars per day; large lumber operations; extensive mining property in districts around the Soo; employs eighteen hundred men.

The site of the power canal of the Company is on certain streams between the islands originally existing in the rapids, and the intake is below the crest of the rapids from a natural bay in the river. The canal from the head-gates to the power house is 2,200 feet long, and the tail-race from the power house to the dredged channel opposite the north and south docks of the Lake Superior Power Company, is about 1,000 feet long. The canal is trapezoidal in section, with an earth and rock bottom and earth banks, the canal sides of which are paved with riprap. It is about 220 feet wide at the water line and about 12½ feet deep at the head gates, changing gradually to a width of 85 feet and a depth of 15½ feet at the power house. The head gates, which are constructed of wood, are located about 70 feet west of the Canadian Pacific Railway where it crosses the power canal. The power is developed by 42-51 inch vertical turbines, and at mean head is about 15,000 horse-power at the turbine shafts. To develop additional power would require either the enlargement of the present canal or the construction of a new canal. The amount that could be developed depends upon the division of the flow of the river for utilization in United States and Canadian territory. The total flow of water, when all water wheels are running to their full capacity, is about 8,800 cubic feet per second, but the average flow is about 7,000 cubic feet per second.

The compensating works erected by the Lake Superior Power Company at the request of the United States War Department for the waters diverted through the canal of the Michigan Lake Superior Power Company on the American side, are located about 150 feet west of the centre line of the International Bridge, opposite spans Nos. 9 and 10, which are those nearest to the Canadian shore. They consist, as at present constructed, of an earth and rock fill dam opposite span No. 10, and a series of four stone and steel sluice gates opposite span No. 9. These gates leave a clean waterway opening each between stone and concrete piers of 52 feet 2½ inches, and the elevation of the sill of the gates is 591, or about 10½ feet below mean water level. The gates are counter-weighted and operated by hand by means of suitable trains of gears. The cost to date is about \$267,000.00. The result accomplished by the compensating works with the gates closed is to reduce the flow through the rapids section by about 10,000 cubic feet per second at mean water level of 601.5 feet above mean tide water

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at New York City. As the gates have not been opened since construction, no data can be given as to the effect on flow under such a condition.

The Lake Superior Power Company claims to have constructed these compensating works under the authority given it by Acts of the Legislature of the Province of Ontario, and more particularly by section 4 of Ch. 88, 52 Vic., page 311 of the Statutes of Ontario, which reads as follows:—

“ After having acquired the land or property necessary for the carrying out
“ of the works hereinafter mentioned, the Company shall have the power to
“ erect engines and employ hydraulic power, and for such purposes to erect,
“ construct and maintain a dam or dams across the inland channels or rapids of
“ the St. Marys River, or of any branch thereof within the Province of Ontario
“ and also to conduct water from the said River and the various branches
“ thereof, and streams entering therein by canals or flumes to be made by the
“ Company at any place on the said rapids along the shores thereof for hydraulic
“ purposes, and may also construct all necessary locks, piers, wharves and other
“ works on the canals, and may extend its work into, and take possession of the
“ bed and beach of the said St. Marys River at the entrance of the canals or
“ flumes, and for the foundation of the same and in their entire length, and at
“ any point at which it may be found expedient to provide an outlet or outlets
“ for the waters of the canals or flumes, or tail races for water-powers taken
“ from the said canals or flumes; the Company may, for the purpose of survey,
“ enter upon all lands on the line of the rapids, and from time to time may pur-
“ chase, acquire, hold and enjoy all lands necessary for all the above purposes,
“ and such ditches as may be necessary along the banks of the said river and
“ streams, or for a road or either or both sides of the river branches, canals and
“ flumes; the Company may make all bridges, intersection, crossings whether
“ through, under, or upon public or private roads, or any aqueduct or canal, and
“ may erect all necessary dams, piers, wharves, raceways, flumes, canals, or
“ other works to secure the necessary supply of water for the works, and may
“ construct and maintain such buildings, mills, machinery, tramways, or rail-
“ ways and switches, wharves and piers, dams, canals, raceways, and other con-
“ duits and works as may be requisite or may be deemed advantageous for carry-
“ ing on the business of the said Company; Provided that it shall be responsible
“ for all damages arising from inundations, if any, which its dams may cause,
“ and all damages which may be caused by the carrying out or maintenance of
“ any of its works; Provided that nothing herein contained shall be held to con-
“ fer the right of expropriating any land or interest therein, or any water or
“ other privilege, and the provisions of this section, so far as they affect
“ or may affect the rights or interests of the Crown or any individual, shall
“ be taken advantage of and exercised only with the consent of the Crown or
“ such individual in that behalf first obtained.”

The Company claims, having been advised by its then solicitor and subsequently by the law officers of the Government of Ontario, that the title to and jurisdiction over the lands under the water on the Canadian side of the river and all the riparian rights appertaining thereto, including those of water-power and hydraulic developments, were vested in the Crown, as represented by the Province of Ontario, and in the Legislature of the Province of Ontario respectively, and as the works were constructed at a point where it was believed the works did not interfere with navigation, counsel for the Company at the time advised that no consent or permission from the Dominion Government was necessary.

The solicitors of the Company further stated that sometime after these works were constructed, and during a visit to Sault Ste. Marie of the Honourable Mr. Tarte, the then Minister of Public Works, and Mr. Coste, late Chief Engineer of the Public Works Department, and at the time employed by said Department as supervising Engineer of the works in course of construction at Port Colborne, Ont., the compensating works were inspected, and Mr. Coste suggested to Mr.

F. H. Clergue, who was then President of the Company, to apply to the Dominion Government for approval of the works then constructed. The present directors of the Consolidated Lake Superior Power Company now understand from Mr. Clergue that, while not conceding that the action of the Company at the time had not been regular and proper, he intended making the application suggested by Mr. Coste, his understanding being that the Minister of Public Works and Mr. Coste were satisfied with the construction, and that it would only be necessary to present a formal application under the statute to obtain the approval of the Government, subject, of course, to such reasonable regulations respecting the operation of the compensating works as the Minister of Public Works might see fit to impose. Owing to Mr. Clergue's retirement from the management of the Company and the subsequent financial difficulties which befell the Company, the matter was overlooked, and it only came to the attention of the directors of the present Consolidated Lake Superior Power Company when the sub-committee, in visiting the compensating works at the Soo, asked under what authority they had erected the same. The Company has, through its solicitor, filed the formal plans and description of the site with the Public Works Department and with the Registrar of Deeds at Sault Ste. Marie. The Company, while not conceding that its action has been in any way irregular, is quite prepared to accept the approval of the Dominion Government, subject to such reasonable regulations as may be imposed respecting the operation of the compensating works.

The application should have been made from the start, in virtue of Ch. 92 of the Revised Statutes of Canada, entitled "An Act respecting certain works constructed in or over Navigable Waters."

The Engineers of the Company report that the mean flow of the St. Marys River, including that through the rapids, power canals and ship canals, has been for the last 24 years about 73,600 cubic feet per second. They further report that it appears probable from the data which they have that the amount of power which can be developed from the flow of the rapids is, commercially speaking, governed not by the mean flow for a period of 24 years, but is that which can be developed from the mean flow from the rapids during years of low water. Under the best conditions that can be obtained with a very complete system of compensating works in the rapids, the flow can probably be regulated so as to obtain a mean annual discharge in the years of low water of about 60,000 cubic feet per second.

10. THE CANADIAN SHIP CANAL.

The sub-Committee, after having visited thoroughly all the plants and the works of the Consolidated Lake Superior Water-Power Company at Sault Ste. Marie, Ont., re-embarked on board the United States Government steamship "Alfred Noble," for a visit to the Canadian and American locks. Mr. J. C. Boyd, Superintendent of the Canadian Canal, accompanied the members of the sub-Committee.

The length of the Canadian lock between the extreme ends of the entrance piers was, at the end of the season of 1904, 6,767 feet. During the season of navigation of 1905, another 800 feet has been added, which, when completed, will make a total length between the extreme ends of the entrance piers of the Canadian canal of 7,567 feet. There is only one lock of 900x60 feet, and it is of solid masonry. The depth of water on sills at lowest known water level is 20.3 inches. But the mean depth on the mitre sills is 22 feet. The total rise or lockage is 18 feet. The breadth of the canal at bottom is 141.08 and the breadth at surface of the water is 150 feet. This canal has been constructed through St. Marys Island, on the north side of the rapids of the River St. Mary. The approaches to the canal are channels dredged through boulder shoals. The superstructure of the entrance piers is concrete. The gates and culvert valves are operated by electricity.

On October 13, 1904, the masts for day marks, from which fixed red

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lights were exhibited to mark the axis of the channel leading to the lower end of the Canadian canal, have been replaced by square, open skeleton, galvanized iron, unpainted towers with sloping sides, surmounted by square wooden lanterns, from which red lights are shown. Each light consists of a group of three incandescent electric lamps, which show strong beams in the line of range and over a small arc on each side thereof. On the channel side of each tower is a white, diamond-shaped day beacon of slatwork.

The front tower is 62 feet high and stands on the shore of the bay north of the entrance to the canal; its light is 63 feet above the water level below the canal and is visible 2.3 miles. The back tower, 72 feet high, is 1,150 feet north of the front light; its light is 78 feet above the river level and is visible 2.3 miles.

To enter the canal from below, the two lights are brought in range opposite the power house, and kept thus until the axis of the canal is reached.

A railway drawbridge crosses the canal with a drawspan of about 144 feet 5 inches clear width between the canal walls, and 15 feet clear height above low water surface. The draw does not sound any whistle, and the closure of the draw is indicated by the waving of flags from the end of the bridge. Boats sound three whistles as a request for opening the draw if it be found closed. The bridge if closed at night, shows a red light.

The Canadian canal was built between the years 1888 and 1895, and the cost with approaches was \$4,000,000.

The Department of Railways and Canals is making extensive improvements at the west or upper entrance of the canal. The eastern or lowest entrance has been deepened to 21.5 feet and to a width of 315 feet. The south pier was originally only 130 feet long. To this a concrete extension has been built 800 feet long, as above stated, making the total pier length 930 feet. This work was completed during the season of 1904.

During the season of 1905 the west or upper entrance has been deepened to a depth of 21.5 feet, and a width from 300 to 500 feet. The work has been in progress during all summer, under contract. The south pier at the west entrance was originally 1,265 feet in length. To this an extension 800 feet long is now being built, under contract. When this extension is completed the length of this pier will be 2,065 feet.

The first lock which was ever built on the Canadian side of the river was erected by the Hudson Bay Fur Company, in 1798. It was 38 feet long, 8.9 feet wide, with a lift of 9 feet. A towpath was made along the shore for oxen to pull the vessels and canoes through the upper part of the rapids. This lock, excepting its timber floor and mitre sills, was destroyed in 1814 by United States troops from Mackinaw Island under command of Major Holmes. This lock has been restored and is to be seen near the general offices of the Consolidated Lake Superior Power Company. The Hudson Bay Fur Company also built a block house nearby to protect the locks from the attacks of Indians, and this structure has been restored, and is now one of the attractions of the Soo, for the double reason of its being what it is and because it was the first home of Francis H. Clergue in the Soo.

II. THE UNITED STATES SHIP CANAL.

After this lock, the first of real consequence was the State lock built on the American side by the State of Michigan, from 1853 to 1855. The canal was 1½-miles long, 64 feet wide at the bottom, 100 feet wide at the water surface and 13 feet deep. There were two tandem locks of masonry, each 350 x 70 feet, having 11½ feet on the mitre sills and a lift of about nine feet each. The locks were destroyed in 1888 by excavations for the present Poe lock. The Weitzel lock, 515 feet long, 80 feet wide in chamber, narrowing to 60 feet, at the gates, was built by the United States in the years 1870 to 1881. It was opened to navigation on September 1, 1881. The depth of water on mitre sills is 17 feet

when the upper pool is 601.9 and the lower pool 584.4 feet above mean tide at New York. At the same time the depth of the canal was increased to 16 feet, the mean width to 160 feet, and the stone slope walls were replaced with timber piers, having a vertical face.

The Poe lock, 800 feet long, 100 feet wide, and having 22 feet of water on the sills, was built by the United States in the years 1887 to 1896. Hydraulic power is used for operating the two American locks, a pressure of 115 pounds per square inch being used for the Weitzel lock machinery and a pressure of about 200 pounds for the Poe lock machinery.

A railway draw bridge crosses the canal at a point about 3,000 feet above the head of the locks and about 300 feet above the movable dam. The clear width of draw opening between canal walls or piers is about 114 feet 5 inches, and the clear height of draw above the low water surface is about 15 feet. For passage of trains, the draw sounds one whistle, then closes, then sounds six whistles answered by two whistles from the waiting locomotive. After passage of train the draw is opened without further signal. Boats sound three whistles, as requested, for opening the draw if it be found closed. The bridge, if closed at night, shows a red light.

This bridge is continued across the St. Marys River at the head of the rapids by ten fixed spans, each of approximately 232 feet clear width and 15 feet clear height above water surface.

During the fiscal year ended the 30th June, 1904, 16,120 vessels passed through the Canadian and the two American locks. These vessels had a total registered tonnage of 24,364,138 tons, and they carried 31,546,106 tons of freight, and 37,695 passengers.

From the opening of the season of navigation of 1905 to November 30th, inclusive, the statistics of the traffic through Canadian and American locks are as follows:—

Through the American locks,	15,614 vessel passages
“ “ Canadian “	5,495 “ “
“ “ American “	9,507 lockages
“ “ Canadian “	3,910 “ “
“ “ American “	30,360,448 registered tonnage
“ “ Canadian “	5,403,906 “ “
“ “ American “	37,641,105 tons of freight
“ “ Canadian “	5,359,368 “ “
“ “ American “	28,315 passengers
“ “ Canadian “	25,741 “ “

These figures are from the opening of navigation to and including November 30, 1905.

The inspection of the ship canals ended the visit of the sub-Committee to Sault Ste. Marie. Before separating a resolution was passed thanking the officers of the Corps of Engineers of the United States Army at Sault Ste. Marie, Michigan, and in particular Mr. L. P. Morrison, Junior Engineer, in charge, for the great courtesy they had extended to the members of the sub-Committee during their inspection of the conditions at the Soo.

Mr. Clinton left to return to his home in Buffalo, and the Canadian section of the sub-Committee proceeded to Duluth via Port Arthur and Fort William, to make a preliminary investigation into the proposed works of the Minnesota Canal and Power Company. They left Friday, August 18th, by the Canadian Pacific Railway Co's Steamship "Athabaska" at 3 p. m., and arrived at Port Arthur the following day at 12 noon, covering the distance between Sault Ste. Marie Ontario, and Port Arthur in about twenty-two hours. The weather being exceptionally fine they had a splendid opportunity of examining thoroughly the conditions of the navigation on Lake Superior, and to obtain valuable information.

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12. ST. MARYS RIVER WEST OF THE SHIP CANALS AND WHITE FISH BAY.

Shortly after having left the western end of the Canadian ship canal, the vessel passed near the Vidal shoal, situated at about $1\frac{1}{2}$ -miles above the rapids, between the United States and the Canadian channels. The removal of that shoal is of paramount necessity, as it is a source of great danger to vessels, particularly in foggy weather.

The route of the vessels off the Vidal shoal is in a direction south-west up to a point opposite Pointe au Chene, Ontario, where it turns in a direction north-west and follows it in a straight line to Ile Royale. At that point the route makes a little turn to the north, as far as Pie Island and Thunder Cape, thence proceeding again north-west to Port Arthur.

The ships enter Lake Superior properly at a point opposite Gros Cap, Ontario, and Point Iroquois, Michigan. The distance between Sault Ste. Marie and Gros Cap is about 30 miles.

13. LAKE SUPERIOR.

Lake Superior is the largest of the Great Lakes and also the largest area of fresh water on the globe. It is characterized by deep water and by high and rocky shores along a large portion of its coast. Compared with the other Great Lakes, its surface is more elevated above the sea; it is more irregular in outline, has deeper and colder water, more fog, more ice, a shorter season of navigation, less rain, about the same snow fall, and winds and seas not greatly different.

The prevailing storms on Lake Superior are from the north-east and north-west. During the summer months the perils of navigation are mainly those of fogs and squall winds, the latter occurring almost invariably in connection with thunder storms. In the spring and the autumn the lake is stormy and dangerous.

The length of the steamer track from Point Iroquois to the entrance of Duluth harbor is 383 miles; from Michipicotan harbor, Ontario, to Duluth, in a straight line, the distance is 350 miles. The breadth of the lake (longitude 86 degrees 45 minutes) is 160 miles. According to the report of the Deep Waterways Commission, published in 1897, the area of the water surface of Lake Superior is 38,800 square miles, but according to the calculations of the Canadian Geological Bureau the total area of the water surface, as divided by the boundary line between Canada and the United States is, in the United States 20,870 square miles and in Canada 11,760 square miles, making a total of 32,630 square miles. The total area of the basin is 80,400 square miles, and the area drained is 48,600 square miles. The total land shore area is 49,370 square miles, divided as follows by the boundary line between Canada and the United States: on the Canadian side 31,730 square miles, and on the United States side 17,640 square miles. The maximum depth recorded by the United States Lake Survey officers is 1,012 feet. According to statistics furnished by the United States Weather Bureau, the average yearly rainfall on Lake Superior is 28 inches; the mean surface of the lake above mean tide at New York city, during forty-five years, from 1860 to 1904, is 602.29 feet. The standard high water above mean tide at New York city is 605.32 feet; the standard low water adopted by the United States Lake Survey for the new charts, above mean tide at New York city, is 600.56 feet. The low water datum for harbour improvements above mean tide at New York city is 601.75 feet. The mean level of Lake Superior above the mean level of Lake Huron is 20.89 feet. The discharge of St. Marys River, as measured in 1902 by the United States Lake Survey officers, at the mean stage of Lake Superior (602.29 feet) is 75,000 cubic feet per second. The increase in discharge per foot rise of the lake is 15,500 cubic feet per second. The average date of the opening of navigation at the St. Marys Falls Canadian

canal is April 27, and the average date of the closing of navigation is December 2nd.

During the year 1904 the monthly mean stages of the lake above mean tide at New York city were as follows:

January	602.51 feet
February	602.32 "
March	602.14 "
April	603.19 "
May ..	602.51 "
June	602.81 "
July	602.91 "
August	602.99 "
September	603.08 "
October	603.27 "
November ..	603.21 "
December	602.82 "

The yearly mean stage in 1904 was, therefore, 602.73 feet.

During the season of navigation of 1905, from March to October, inclusive, the mean stages of Lake Superior have been as follows:—

March	602.05 feet
April	602.24 "
May	602.48 "
June ..	602.76 "
July ..	603.08 "
August	603.21 "
September	603.41 "
October ..	603.42 "

The Canadian Government has established storm warning stations at Fort William, Port Arthur and Sault Ste. Marie. At Fort William it consists in a signal mast, a little to the east of the C. P. R. elevators. At Port Arthur a signal mast is to be seen on the inner end of the government wharf, and another signal mast exists on the government wharf at Sault Ste. Marie, Ontario. The United States Government has established life-saving stations at the following places:—

Crips, Michigan; Duluth, Minnesota; Grand Marais, Michigan; Marquette, Michigan; Muskallonge Lake, Michigan, near the mouth of Sucker River, 15½ miles easterly of Grand Marais; also at Portage Lake ship canals, Two Hearted River and at Vermillion Point, Michigan.

Compared with others of the Great Lakes, Lake Superior was fairly well provided with natural harbours, and the works of improvement, on the Canadian side as well as on the United States side, have created additional harbours of refuge at various points. One class of improved harbours consists of bays of generally deep water, having wide mouths, or openings towards the lake, which have been provided with breakwaters to partially close the natural openings and form the desired protection.

A second class of improved harbours consists of those whose entrances are formed by parallel piers or jetties extending from the shore out across a bar of gravel or sand to the desired depth of water, the primary object being either to confine the current to a fixed and narrow width in order to scour and maintain the channel to the depth needed, or to prevent an improved channel from being filled by drifting sand.

Port Arthur affords an illustration of a dredged channel protected from waves and drifting material by a breakwater pier. In late years deeper channels have been required than could be obtained by the scouring action of the currents alone, and dredging has been resorted to. In the harbours at the mouths of rivers the enlargement of the channels by dredging has reduced the velocity

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of the outgoing currents and changed their action from that of scouring to that of depositing silt or coarser material, so that further dredging from time to time has become necessary. Therefore the jetty piers now serve only to protect the improved channels from the filling up which would result from the action of storm waves and of the so-called littoral currents.

Among the natural and improved harbours on the Canadian side of Lake Superior, from Gros Cap, at the head of St. Marys River to Port Arthur, there are Goulais Bay, with an average depth of nine fathoms inside and which affords good anchorage and protection from all winds; Gargantus harbour, a small harbour of refuge, about 77 miles from the head of St. Marys River, which affords good anchorage and shelter; Michipicoten harbour, on the northerly shore of Michipicoten Bay, and the eastern shore of Lake Superior, which is one of the lake terminals of the Algoma Central Railway; Peninsula harbour, Nipigon Bay and Thunder Bay, which is a fine sheet of water extending 35 miles in a north-east and south-west direction, with a width of 15 miles north-west and south-west, narrowing at both ends. On its shores, cliffs rise from 1,000 to 1,350 feet out of the lake. The north-west coast of the bay, extending from Port Arthur to its head, may be approached within a mile.

About 25 miles opposite Thunder Cape is Isle Royal. The north shore of this island can be approached with safety within three-quarters of a mile of the general direction of the coast. Right at the mouth of Thunder Bay is Pie Island, about 900 feet high, eight miles long east and west by four miles wide. Good anchorage from southerly winds is to be found off the north and north-west sides, and from northerly winds off the south side. The passage between Pie Island and Thunder Cape, $5\frac{1}{4}$ miles wide, is quite clean. Thunder Cape is a very prominent headland, about 800 feet high, marking the coast entrance to Thunder Bay. Upon its south end is a lighthouse tower 45 feet high, exhibiting a light revolving white every minute, visible at 14 miles. A steam fog-horn sounds blasts of five seconds every half minute. All parts of the cape may be approached to within 200 yards.

On the north-western side of Thunder Bay is Port Arthur, the western terminus of the Canadian Northern Railroad.

14. PORT ARTHUR AND FORT WILLIAM.

Port Arthur is rendered safe by breakwaters parallel to the shore, the entrance being through a gap marked by a fixed red light, 43 feet high, upon the northern portion of the breakwater. The channel is dredged, and 19 feet may be carried to the Canadian Northern Railway Company's elevator. The inner harbour at Port Arthur is therefore formed by two crib-work breakwaters extending in front of the wharfs on the water front of the town. The more northerly breakwater is 3,654 feet long, and has a general trend of south 25 degrees west from a point outside the elevator wharf at the north end of the town. The lighthouse is on this breakwater, and is situated at 31 feet from its south end, showing, as above stated, a fixed red light 43 feet high.

The breakwaters are sunk generally in 17 and 18 feet of water, and have a height of five feet six inches above low water. On the lake side the crib work is made vertical up to about low water line, and from there to the top it is finished with a slope one in one, strongly sheeted and the angles protected by boiler plates. The construction of this breakwater has converted what was formerly a dangerous and exposed roadstead into a safe and commodious harbour.

The main entrance between the breakwater is 366 feet wide and is lighted as above noted. A red gas buoy showing a white acetylene gas light automatically occulted at short intervals, is moored in the prolongation of the dredged channel, 2,575 feet south-east by east of the breakwater light. Mariners find the best water by passing 50 to 100 feet south-west of the buoy and steering

to pass the same distance off the northern breakwater, when not less than nineteen feet will be found.

There are two other entrances: The western entrance 1,800 feet in width and reported in 1899 as 12 to 18 feet deep, and the eastern entrance 250 feet wide and reported in 1899 as 17 feet deep. The depth of water in the basin was reported in 1899 as varying from 14 to 18 feet.

The Pigeon River Lumber Company have at Port Arthur a large saw mill and, besides, several new industries are developing. Port Arthur is connected with Fort William by an electric railway, and both cities have a common telephone system.

Fort William is situated five miles west of Port Arthur, on the west side of Thunder Bay and at a short distance up the Kaministiquia River, described as a broad stream with firm banks and good advantages for lake traffic. Fort William is the great shipping port of the Canadian north-west.

The Kaministiquia River rises in Dog Lake, at an elevation of about 718 feet above Lake Superior, and flows southerly and then easterly to the lake, a distance of about 42 miles. Falls and rapids are found along its course down to a few miles above the lake. It bifurcates twice in the vicinity of Fort William and has three mouths, known as Fort William River, McKeller's River, and Mission River. Extensive dredging operations by the Canadian Government have deepened and widened the channel over the bar at the mouth, and up the river to Fort William, and provided basins for the use of vessels. The nature of the river is such that sand bars are formed at the mouth each season.

The channel at Fort William is dredged and 19 feet of water may be carried into Fort William, and 16 feet may be found five miles up the river to the coal unloading plant of the Canadian Northern Railway Company.

For the purpose of extending the period of navigation a powerful tug has been employed in the fall of the year of 1904 to prevent the formation of ice on the shoals at the mouth of the river, or to break it loose if formed, and thus keep the channel open for a longer time. The material brought down by the river is fine and appears to consist of clay and light sand. The shoals extending out from the mouth on either of the channels, to the vicinity of the Welcome Island, are sandy and have a very gentle slope, so that sailboats may ground half a mile from shore within hailing distance of vessels navigating the channel.

From Mutton Island, which is situated a short distance north of the mouth of Mission River, to the shore the water is so shallow that it is scarcely possible for even a row-boat to pass. This shoal appears to be the direct product of the action of the waves and the final result will probably be a bar connecting the island with the shore.

Fort William harbor is well lighted.

A cylindrical gas buoy, displaying a white acetylene gas light automatically occulted at short intervals, is moored at the outer end of the northern edge of the dredged channel.

The axis of the channel is marked by two fixed red range lights. The front tower stands on the east end of the timber facing of the Canadian Pacific Railway coal yard, which forms the north shore of the river at that point, and is close to the water's edge; the light is 42 feet above water-level. The rear tower stands behind the trestles and pockets of the coal plant, by which it is partially hidden from the water, and is 122 feet high and painted red. A day-mark, near top of lantern column, consists of a black square, six feet on a side, with a white diamond in the middle. The light is incandescent electric, 128 feet above lake level, and is visible $12\frac{1}{2}$ miles in the line of range.

The towns of Fort William and Port Arthur afford a most striking example of Western progress. The population has doubled in two years. Port Arthur has now 7,000 people, and Fort William 7,500. It is predicted that within five years there will be 50,000 people within the borders of the two cities. This

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remarkable growth is due to the advantageous situation of Port Arthur and Fort William, and their unexcelled railway and steamship facilities. They are the gateways to the great West, the spout of the hopper from which pours millions of bushels of grain grown on the Western prairies and a large proportion of which is transshipped there, to be carried down the lake to Georgian Bay points or to Cleveland, Buffalo, Kingston and Montreal. The facilities for handling this great crop at Port Arthur and Fort William are being increased from year to year. The elevator storage capacity at Fort William and Port Arthur, according to the latest figures, are as follows:—

At Fort William—

Canadian Pacific Railway Elevators, A and C . . .	2,750,000	bushels
“ “ “ “ B and E . . .	2,500,000	“
“ “ “ “ D . . .	3,162,000	“
		<hr/>
Total	8,412,000	“

The Empire Elevator Company, Ltd.	1,700,000	bushels
The Ogilvie Flour Mills Company, Ltd.	750,000	“
		<hr/>

Total at Fort William 10,862,000 “

At Port Arthur—

Canadian Northern Railway, Elevators, A	3,500,000	bushels
“ “ “ “ B	3,000,000	“
		<hr/>

Total 6,500,000 “

J. G. King & Co.'s Elevators	800,000	“
		<hr/>

Total at Port Arthur 7,300,000 “

The total amount of wheat shipped at the Canadian Pacific Railway elevators at Fort William for the year ended December 31, 1904, is 22,534,416 bushels. The total amount of wheat shipped out of the same elevators from the 1st of January to the 21st of November, inclusive, 1905, is 17,511,041 bushels.

On the other hand, the Canadian Northern Railway Company, in a statement furnished December 1, 1905, states that the total storage capacity of its two elevators at Port Arthur is 7,000,000 bushels. The two working houses have a total receiving capacity of 250 cars per ten hours, and a shipping capacity into the vessels of 225,000 bushels per hour.

From the crop of 1904 the Canadian Northern Railway passed 7,024,550 bushels through its elevators, and from the crop of 1905, up to and including November 25th, the Company received into its elevators at Port Arthur 6,070,002 bushels.

The elevators of the Empire Elevator Company, limited, was constructed at Fort William in 1904 and completed December 1st of that year. The wooden working house of the elevator has a capacity of 500,000 bushels, and there is besides a fire-proof storage of a capacity of 1,250,000 bushels. The total amount of grain handled during 1904 is 5,000,000 bushels, and during 1905, up to November 30th, 6,000,000 bushels.

In 1904 and in 1905 a channel was dredged by the Department of Public Works along the face of the Empire Elevator Company's new dock. When completed this channel will be 140 feet in width and will have a depth of 22 feet below zero of the new gauge adopted in January, 1904. The channel of the River Kaministiquia from the Mission River to the Canadian Northern Railway coal dock at West Fort William has been widened and deepened in places where shoals were found. During the season of 1904, the sum of \$91,508.92 was spent in this work by the Department of Public Works, and a further sum of \$195,000.00 was appropriated for the season of 1905.

The Ogilvie Flour Mills Company, Limited, have started to erect at Fort William one of the largest flour mills in Canada, and several eastern concerns are negotiating for locations to start branch factories. It is expected that within the next few years there will be an industrial development at the head of the lakes, second to no other city in Canada.

15. THE WATER POWER AT KAKABECA FALLS.

Another factor of the development at Fort William and Port Arthur will be the availability of electric power from Kakabeca Falls, which the members of the sub-committee took occasion to visit.

Kakabeca Falls proper are situated about 16 miles from Fort William. For upwards of a mile above the actual falls, the river tumbles down a succession of rocky inclines, forming the Ecarte Rapids, at the head of which a company, composed of Montreal capitalists, has constructed the intake of its power canal.

Skirting the valley of the river on its northern bank, the Canadian Northern Railway passes within a quarter of a mile of the falls. The Power Company has been engaged during the whole summer of 1905 in the harnessing of the river as follows:—

From above the Ecarte Rapids a gigantic circular flume or aqueduct is being laid at an elevation which will add another forty feet to the hundred and twenty of the falls, while the lower rapids, below which the turbines are being placed, will add yet another twenty feet, giving a total head of no less than one hundred and eighty feet, higher than all but one of the heads of water at the power development at Niagara, and only falling short of that one by a small space that could be measured by inches. The aqueduct is a huge tube of concrete, ten feet in its inside diameter, the whole structure being strongly reinforced with hoops of steel and bars running in a longitudinal direction, forming a network of steel of six-inch mesh, imbedded in solid concrete. The construction of this aqueduct is unique in American engineering, the only others of a somewhat similar kind being built in France, so that the successful completion of this work may prove to be an important epoch in the solution of engineering problems relating to water-power development.

From the point of intake to the outlet into the main reservoir, which is on the brow of a steep ridge overlooking the site of the power house, 180 feet below, this pipe lies practically level for a distance of 7,000 feet, and after being discharged into the reservoir the water is divided and flows through two seven-foot penstocks, which run at a steep incline to the water wheels on the bank of the river.

The construction of the flume will require approximately 35,000 yards of concrete, and the progress of the works has been facilitated in the most material manner by the fact that the ground through which the big pipe runs is largely made of beds of gravel of an excellent quality for the making of concrete, so that the excavation of the shallow ditch in which it lies provides at the same time an important item in the material required for the building of the conduit. At its upper end it will traverse a rocky belt, and it is estimated that 35,000 cubic yards of rock will have to be removed here and the place where the power house is under construction.

Across the Kaministiquia, just below the intake, a dam is being thrown, 20 feet in height, there being already a depth of 14 feet in the river at this point. The design of this dam is such as to admit the passage of the maximum flow of water without materially affecting the levels of the upper reaches of the river when it is in flood, while retaining enough to keep the big flume filled to its capacity even when the stream is at its lowest.

The reservoir into which the flume discharges is a massive structure of

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concrete and steel, from which are fed the two steel penstocks leading direct to the turbine wheels, 180 feet below. Each of these wheels will be capable of developing 7,000 horse-power, the initial development which is now under way being thus 14,000 horse-power.

The plans are, however, being prepared, and the work laid out so as to permit of this being doubled at any time by the building of a second flume and providing two additional penstocks, all the rest of the plant being capable of working to the double capacity. In fact, the present operations are intended to be merely the commencement of a water power development which will be on a very large scale, and the ultimate development may greatly exceed that here outlined, for, if the demand for power at the head of the lakes should exceed the 28,000 horse-power thus provided, there is ample reserve behind to duplicate it, and possibly to multiply this by two again.

From the power house at its point of generation, the electric energy will be transmitted to Fort William along a copper wire, at a pressure of 25,000 volts to the sub-station now being erected in the western end of the town, and from this it will be stepped down to any voltage that may be required by consumers. This sub-station is a plain but massive building of concrete and steel, with a floor area of 5,600 square feet and a height of 40 feet.

Construction on the harnessing of the river is being pushed ahead with even greater rapidity than was anticipated, and with an army of about 700 constantly employed through the winter, the Company will have the current transmitted to Fort William by June 1, 1906. A bargain has been struck with the town of Fort William, under the terms of which the town will get 600 horse-power at a flat rate of \$25.00 per horse-power for a 20-hour service, and the Ogilvie Mills will be ready to use power by the spring of next year, the elevator of the Company being now operated by electrical power provided by the town plant and generated by steam.

How great will be the effect of this power development upon the future of Fort William as a manufacturing centre for all industries that are seeking to enter the growing markets of the great West, can be readily appreciated. Raw material can be delivered on the docks of Fort William as cheaply as at any port on the lake system, while the railway haul from this point to the places of consumption is short as compared to the distance from the factories of the East, and the rapid settlement of Manitoba and the Provinces of the West will, in the near future, make the West one of the most important markets for all kinds of manufactured articles in Canada.

After their visit in the harbors of Port Arthur and Fort William and the surrounding country, the members of the sub-committee went across to Duluth, leaving Fort William on Sunday evening, August 20th, on board the steamship "Huron," of the Northwestern Navigation Company.

Arriving at Duluth the following morning, before noon, they visited the harbour of Duluth.

16. THE HARBOUR OF DULUTH.

The harbour of Duluth and the harbour of Superior are practically the same, and they include all navigable waters lying inside of Minnesota Point and along the fronts of the cities of Duluth and Superior to the city limits of each, embracing the new Duluth Canal, Superior Entry, Superior Bay, Allouez Bay, St. Louis Bay and St. Louis River as far westerly as the bounds of the city of Duluth.

Before improvement, the bays were broad expanses of shallow water with a general depth of only eight or nine feet, except along the channels, which were deeper but variable. The natural entrance to Superior Bay from Lake Superior, now called Superior Entry (also known as the Wisconsin entrance),

was a winding channel over a shifting sand bar, with an available depth of nine to 11 feet, and difficult to follow.

The United States commenced the work of improvement at Superior Entry in 1867, under a plan providing for building two parallel jetties across the bar and dredging a channel between them, and began operations at Duluth in 1871, under a plan providing for the extension of the breakwater commenced by the Northern Pacific Railroad just outside of the northerly end of Minnesota Point. The extension was completed for a distance of about 1,000 feet from shore, but the superstructure was destroyed by storms, leaving the cribs submerged.

The Duluth Canal was cut through Minnesota Point by the city of Duluth in 1870 and 1871, and in 1873 its maintenance and improvement were undertaken by the United States to provide an inner harbor of easy access in place of the exterior harbor, for the formation of which the breakwater had been constructed.

The latest approved project provides for the widening and deepening of channels to a navigable depth of 20 feet, for a new channel in Allouez Bay, a new channel in St. Louis Bay extending northerly, and a new channel in St. Louis River; for extensive turning and anchorage basins at the junction of various channels; for widening the Duluth Canal and rebuilding the piers; and for rebuilding the piers at Superior Entry. The work of widening the Duluth Canal and rebuilding the piers was completed in 1901. The extensive dredging contract, under which work was in progress for nearly six seasons, and which involved the removal of over 21,500,000 yards of material, was completed November 14, 1902.

The work of rebuilding the piers at Superior Entry was begun in the spring of 1903. There will be two new piers built of concrete, the south pier 2,960.5 feet, and the north pier 3,418.5 feet in length. The work in the seasons of 1903 and 1904 was upon the westerly half of the south pier, which is located about 70 feet south of and behind the old south pier, the old pier remaining in place while the new one is under construction. About 1,600 lineal feet of the new pier was completed at the close of the season of 1904. The operations of 1905 have been on this line and have not interfered in any way with navigation.

The new piers of the Duluth Canal, completed in 1900-01, are of equal dimensions, and the clear width between them at the entrance and for a distance of about 1,250 feet from the outer end is 300 feet, after which they flare out at the harbour end to a width of about 540 feet. Each has a length of about 1,700 feet, and projects about 2,150 feet beyond the shore line.

The foundation cribs extend 22 feet below low water datum and the concrete superstructure rises from 10 to 18 feet above that plane. Riprap has been placed along the base of the piers to prevent undermining by currents. Along channel faces of north and south piers is 16 to 23 feet of water over the riprap, dropping off rapidly to greater depths except for the outer 450 feet of channel face of south pier, where there was formerly a rock embankment; this embankment has been partially removed, leaving a depth of 11 to 16 feet close to the pier, a least depth of 17 feet at 20 feet out, and 23 feet at 33 feet out from pier. The clear width of channel with 23 feet least depth is about 240 feet; depth along mid-channel is at least 25 feet.

One of the principal attractions of the harbour of Duluth is the new Aerial ferry or suspended-car ferry over the Duluth Canal. The truss which spans the channel has a clear height of 138 feet above low water datum, 137 feet above ordinary high water, and about 135 feet above the highest recorded stage of water in the harbor. Any vessel on the Great Lakes can freely pass under the bridge. The car, which is suspended from a trolley or truck running on the overhead track and reaching down to within about 12 feet of the water, has

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been completed and inaugurated last summer. The car is 50 feet long and 31 feet wide, is propelled by an electric motor, which is placed under the floor of the car and turns a drum from which cables lead up to the overhead truck and then along the bridge to either tower.

The car is large enough to carry at the same time street-car, teams and foot passengers, the motor is in duplicate, and two independent sources of electric current are available, either of which can be turned on quickly in case the other fails. There is a controller at each end of the car, and the operator is stationed at the forward end of the car. The time required for crossing the channel is $1\frac{1}{2}$ minutes. There is an additional and independent hand gear for propelling the car in case of failure of the electric motor. This moves the car much more slowly, and is used only for the purpose of getting the car away from the channel in case of a breakdown.

The steel bridge is 393 feet long, and the bridge supports at the ground are 78 feet wide. This aerial bridge was completed in 1904, at an expense of \$100,000. It is free to the public and it has a carrying capacity of 25,000 pounds.

17. THE PROPOSED WORKS OF THE MINNESOTA CANAL AND POWER COMPANY.

During their visit to Duluth, the members of the sub-committee had several interviews with persons and companies interested in the proposed works of the Minnesota Canal and Power Company at St. Paul and Minneapolis, parties also interested in the proposed undertaking of said Company were interviewed informally and valuable information was obtained.

At the height of land in St. Louis and Lake Counties, in northern Minnesota, the waters from Birch Lake and White Iron Lake, and the streams running out thereof, and the immense watershed thereof, run northward and ultimately into Rainy Lake, and from there into Rainy River, passing into the Lake of the Woods. The water from this source forms by computation seven per cent. of the water passing out of Rainy Lake over Alberton Falls at Koochiching. The water system of Rainy River and Lake of the Woods have long been established as a commercial highway. From the Canadian ports of Rat Portage and Fort Francis two large and well equipped passenger and freight lines ply daily during the season of navigation, forming the means of water communication between the Canadian ports of Rat Portage, Rainy River town, Boucherville, Barwick, Emo, Big Forks, Little Forks, Isherwood, Fort Francis, Bears Pass, Seine River and Mine Centre, and forming along a considerable part of such route the only vehicle of passenger and freight communication.

The most important section of the 200 miles of navigation is the Rainy River, flowing through what is rapidly becoming a thickly populated and prosperous valley for some 80 odd miles, with towns rapidly building up at close intervals on its banks, dependent almost wholly on the river route for their mercantile and manufacturing interests. The fine class of steamboats plying on this water is already, in certain portions of the summer, hampered by low water on the rapids and shoals of the river, and the proprietors of the regular steamboat lines have been earnestly petitioning for such improvement being made on the river as would remove such disability, a disability that compels the withdrawal, for considerable intervals during each summer, of some of the large and deeper draught steamboats. In view of the fact that navigation is already suffering for lack of adequate water in portions of Rainy River and in portions of Rainy Lake, the population of that district has learned with surprise and alarm that active steps had been taken by the Minnesota Canal and Power Company, of Duluth, Minnesota, to obtain the authorization of the Federal Government of the United States, through the Commissioner of the General

Land Office at Washington, to construct a dam or dams and canal to divert all the waters of Birch Lake and White Iron Lake watershed, hereinbefore referred to, into the Embarrass River, and by it into Lake Superior at Duluth, thus diverting from this long established international waterway of Rainy Lake and Rainy River a large proportion mentioned of its tributary waters. It is claimed that, if permission be given by the Federal Government of the United States to the project of the Minnesota Canal and Power Company, a disastrous injustice will be done to Canadian and American established navigation companies that are now using the water highway of Rainy Lake and Rainy River, and to the manufacturing towns along the river, both on the Canadian and United States sides.

It is claimed that the waters of Birch Lake and Birch River and White Iron Lake help to form the chain of lakes and rivers along the boundary which are referred to in the Webster-Ashburton Treaty, and which, by the terms of that treaty, are a public highway, free to the citizens and subjects of both countries. The scheme of the Minnesota Canal and Power Company is to take 600 cubic feet per second out of a total estimated average flow of 985 cubic feet per second. The minimum flow is estimated at 210 cubic feet per second. The quantity to be taken, 600 cubic feet per second, would be more than the natural flow during the greater part of the year.

The corporation of the town of Fort Francis on March 17, 1904, sent to the Minister of Marine and Fisheries of Canada a protest against the proposed undertaking of the Minnesota Canal and Power Company. This protest has been sent by the Canadian Government to the United States Government through the British Embassy at Washington.

On January 25, 1905, the Acting Secretary of State, F. B. Loomis, informed the Right Honourable Sir H. M. Durand, G. C. M. G., the British Ambassador at Washington, that the United States Secretary of the Interior had directed the Commissioner of the General Land Office, before whom the application of the Minnesota Canal and Power Company was pending, to suspend further action in the case until advised as to the result of the inquiry which was to be made by the International Water Boundary Commission. This clearly meant that, in the opinion of the United States Government then, the case of the Minnesota Canal and Power Company was to be investigated and reported upon by the International Waterways Commission. Later on, somewhere in the month of March, 1905, the Attorney-General of the United States, called upon to give his opinion on the construction to be put upon the Act of Congress authorizing the appointment of the Commission, stated in reference to the case of the St. John River, New Brunswick, that the jurisdiction of said Commission was limited to the system of the Great Lakes and the St. Lawrence River.

The members of the sub-committee informed the various parties they interviewed at Duluth, Minnesota, and at St. Paul and Minneapolis, that the Canadian section of the Commission was willing to take up the case of the Minnesota Canal and Power Company, according to instructions received by them from the Canadian Government, but that the American section had expressed doubts as to whether or not they had the power to deal with it.

18. WORKS OF THE ONTARIO AND MINNESOTA POWER COMPANY, KOOCHICHING FALLS.

Since the Minnesota Canal and Power Company made this application to the United States Secretary of the Interior, the Rainy River Development Company and the Ontario and Minnesota Power Company have constructed extensive works at Koochiching Falls for the purpose of improving navigation in Rainy Lake and Rainy River, with the expectation of using the power which will be developed for manufacturing purposes. The Ontario and Minnesota

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Power Company, under a contract with the Ontario Government, had acquired the Canadian end of the Koochiching Falls, and a number of acres of shore land adjacent. They have obtained during the last session of Parliament an Act of Incorporation, being Chapter 139, and entitled "An Act respecting the Ontario and Minnesota Power Company."

By an Order-in-Council, approved by the Governor-General on September 19, 1905, the Minister of Public Works and the Government of Canada have approved the plans of the Ontario and Minnesota Power Company. The engineers of the Department of Public Works stated that in so far as the construction of the dam at Koochiching Falls is concerned, it will in no way interfere with navigation above or below the fall at Fort Francis, but will, in fact, be an improvement. The dangerous rapids, two miles above Fort Francis, will be flooded, thereby improving materially the navigation. The freshet waters stored in Rainy Lake could be let out, during the season of low water, thereby also considerably improving navigation of the river between Fort Francis and the Lake of the Woods. The only objection that could be raised to the proposed elevation of the dam is provided for by a proposed revetment wall to be constructed by the Company, and also by a clause in the Act of Incorporation of the Company, which makes all damages to lands caused by their works a charge to be borne by them.

The proposed works of the Minnesota Canal and Power Company would interfere with the works authorized by His Excellency the Governor-General-in-Council. It is expected that soon after the present session of Congress, the International Waterways Commission will take up this question.

19. THE HARBOUR OF CHICAGO, AND THE CHICAGO DRAINAGE CANAL.

The members of the sub-committee left St. Paul on Wednesday evening, August 23rd, for Chicago, in view of making a visit to the Chicago Drainage Canal, and a preliminary investigation on a question presented to the Commission at its meetings of June 14th and 15th in Toronto, viz.: "The effect of the diversion by the Chicago Drainage Canal of 10,000 cubic feet per second on the levels of Lakes Michigan, Huron, Erie and Ontario, and on the River St. Lawrence."

The first day of their visit to Chicago was spent in making an inspection of the harbour of Chicago and of the large improvement works constructed therein by the United States Government.

As stated in the reports of the Engineers of the United States War Department, the harbour of Chicago originally could be used by none but the smallest craft, and then only when temporarily deepened by scour due to freshets. Before improvement by the government, Chicago River made a sharp turn to the southward upon approaching the lake shore, to which it ran parallel for a considerable distance before emptying into the lake, being separated from the latter by a long, narrow sand spit.

The first improvement was undertaken by the government in 1833, and consisted in cutting through the sand spit at the point where the river made a sharp turn to the southward, in protecting the banks of this cut by pile pier revetments, which have been extended from time to time, and in aiding the natural scouring of the channel between the piers by dredging. In 1870, to provide a safe anchorage ground for vessels loaded for departure, but detained by gales, or for others seeking shelter at such times, also to provide facilities for relieving the over-crowded condition of the river, and to protect the wharfs and slips proposed to be constructed along the lake front between Randolph and Twelfth streets, the easterly breakwater was projected, and later the southerly breakwater. In 1878, to facilitate entrance to the harbor, and to provide a sheltered anchorage ground in deep water during severe northerly storms, the exterior breakwater was proposed. The works of improvement

include dredging harbor entrance and a portion of basin to a depth of from 21.8 to 22.8 feet; improving the piers at the mouth of the Chicago River, and extending the easterly, southerly, and exterior breakwaters.

The exterior breakwater is about a mile north-east of the entrance to the river; it is 5,413 feet long, 30 feet wide, and was constructed between 1880 and 1889 in water varying from 18 to 32 feet in depth. It has proved a decided benefit to navigation. The harbour of refuge between this breakwater and the entrance to the river has a depth of 18 to 32 feet. The easterly breakwater is about 4,037 feet long, with a shore return at the north end 300 feet long. The southerly breakwater begins about 750 feet south of the southerly end of the easterly breakwater, and is about 3,000 feet long. The easterly and southerly breakwaters, with the south pier to the north and the shore to the west, form the outer basin. The construction of the proposed wharfs and slips along the lake shore from Randolph street to Twelfth street, having been delayed from year to year by the lake front litigation, was finally abandoned, and a bulkhead was built in 1896 along the dock line established by the Secretary of War in August, 1871, and September, 1890; the area west of the bulkhead has been designated as a public park and is being gradually filled in, thereby reducing the area of the basin to 270 acres. Its length is about 7,300 feet, and its greatest width is about 2,000 feet. The basin for 1,150 feet width along easterly breakwater and 3,000 feet length southward from south pier, has been dredged to 32.8 feet depth. The undredged portion of the basin is very irregular in depth, varying from 12 to 20 feet at low water.

Chicago is divided into three sections by the Chicago River with its two branches. This river is a mile long and presents a busy appearance with vessels docked all along its banks.

One of the interesting features of Chicago is the Drainage Canal, which unites the Chicago River and the Mississippi River system, and saves the lake from being polluted by the drainage of Chicago's sewerage system. This canal cost \$34,000,000.

The following dimensions of the Drainage Canal are furnished by the officer in charge: Distance from mouth of Chicago River to junction of main channel of canal, with the west fork of south branch of Chicago River at Robert street, about six miles. Length of main channel, Robey street to controlling works at Lockport, 28.05 miles. Dimensions: Robey street to Summit, 7.8 miles, 110 feet wide at bottom, 198 feet wide at water line, with minimum depth of water, 22 feet; Summit to Willow Springs, 5.3 miles, 202 feet wide at bottom, 290 feet wide at water line, with 22 feet depth of water: at Willow Springs the channel narrows to the walled bottom, and rock cross-section, extending 14.95 miles to Lockport, 160 feet wide at bottom, 162 feet wide at top. This canal is not yet entirely completed. It was designed to take up eventually a volume of 10,000 cubic feet per second. This represents about five per cent. of the flow over Niagara Falls, which is about 222,400 cubic feet per second. The Chicago Drainage Canal, when completed, will, according to a calculation furnished by the Engineer of the Canadian Section of the Commission, lower the level of Lake Huron by six inches and the level of Lake Erie by four and a half inches. But the Chicago Drainage Canal takes now less than half of the volume originally contemplated.

The United States War Department, in its power of conservancy to protect the navigation in the Chicago river, has, December 5, 1901, limited the volume of water which can be taken through it into the Chicago Drainage Canal, to 250,000 cubic feet per minute throughout the 24 hours of the day, which is about 4,166 cubic feet per second. If the original plans of the Chicago Drainage Canal are carried out, and it seems likely that this will be done, it will eventually take out, as above stated, 10,000 cubic feet per second.

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20. LAKE MICHIGAN

The city of Chicago has a frontage of thirty miles along the shore of Lake Michigan, which is the only one out of the five Great Lakes having its entire shores in United States territory.

The area of the water surface of Lake Michigan is 22,400 square miles, its drained area is 45,700 square miles, and the total area of its basin is 68,100 square miles. The average annual rainfall on Lake Michigan is 33 inches. The maximum depth recorded by the United States Lake Survey officers is 870 feet. The steamer track on the lake from Chicago to the Strait of Mackinac is 321 miles. The mean surface of the lake above mean tide at New York city during 45 years (1860-1904) is 581.35 feet. The standard high water (of 1858) above mean tide at New York city is 584.69 feet, and the standard low water above mean tide at New York city is 578.51. The mean surface of Lake Michigan below the mean surface of Lake Superior is 20.94 feet. The average date of opening of navigation at the Strait of Mackinac is the 17th of April, and the average date of closing of navigation at the same place is 9th of January.

The following list gives the monthly mean stages of the lake, above mean tide at New York city, during the year 1904:—

January	579.90 feet
February	579.86 "
March	580.14 "
April	580.59 "
May	580.65 "
June	580.34 "
July	581.38 "
August	581.23 "
September	581.19 "
October	581.05 "
November	580.75 "
December	580.37 "

The yearly mean stage in 1904 was 580.65 feet.

During the season of navigation of 1905 the monthly mean stages of Lake Michigan have been as follows:—

March	580.31 feet
April	580.60 "
May	581.03 "
June	581.36 "
July	581.49 "
August	581.46 "
September	581.40 "
October	580.94 "

Lake Michigan is navigable in winter. This navigation is of importance and is increasing.

At the present time there are the following regular winter lines of steamers:—

Two lines from Milwaukee to Racine and Chicago.

One line from Milwaukee to Sturgeon Bay Canal and intermediate ports.

One line from Milwaukee to Grand Haven.

One line from Milwaukee to Ludington.

One line from Manitowac to Ludington.

One line from Manitowac and Kewaunee to Frankfort.

One line from Frankfort to Manistique.

One line from Northport to Manistique.

Efforts have been made to maintain a regular winter line from Frankfort to Menominee via Sturgeon Bay Canal or "Death's Door," but as yet they have not proved successful.

21. DETROIT RIVER AND LIMEKILN CROSSING.

The members of the sub-committee left Chicago on Saturday, August 26th, for Detroit, so as to make an inspection of the Detroit River, which unites Lake St. Clair to Lake Erie.

After a visit to the office of the United States Lake Survey, in the Campau Building, where valuable information and important documents bearing on the work intrusted to the Commission, were obtained, a trip down the Detroit River was undertaken. First of all, it will not be out of place to give here a description of the river as furnished by the Engineers of the United States War Department at Detroit, viz.:—

"The Detroit River has two characteristic sections, the upper or undivided portion, and the lower or divided portion. The upper or undivided portion runs from Lake St. Clair to the head of Fighting Island, a distance, by steamer track, of 13 miles. At this point the river is divided by islands into several channels, which do not reunite at the mouth of the river. The distance from the head of Fighting Island to Bar Point Shoal lightship by steamer track is $15\frac{1}{4}$ miles, making the total distance from Lake St. Clair to Lake Erie $28\frac{1}{4}$ miles."

The discharge through the upper or undivided portion of the river is 208,600 feet per second when Lake Erie is at a stage of 572.61 feet above mean tide at New York. The increase of the discharge per foot rise of the lake is approximately 21,000 cubic feet per second.

Throughout the upper portion of the river the mean current velocity is about $1\frac{1}{2}$ miles per hour; but at Limekiln Crossing, near the mouth of the river, the mean velocity is about $2\frac{1}{2}$ miles per hour, with a maximum velocity of about five miles per hour. For the northerly 16 miles the river bottom is of earth and the channel banks are usually quite steep, but at the southerly portion the river bottom consists mainly of bed rock and boulders, and the channel banks usually are more sloping. In the upper portion of the river there are two islands—Isle aux Peches and Belle Isle; there is deep water on each side of these islands.

Originally the channel at Limekiln Crossing could not be depended on for more than 13 feet of water, the ordinary depth being much affected by the direction of the wind. It was in 1874 that the United States Government started work of improvement at this point, and they consisted of a curved channel of 300 feet wide, with a uniform depth of 20 feet. In 1883 it was determined to modify the project so as to secure a straight channel, the least width of which should be 300 feet with a somewhat greater width at either end. In 1886 this was further modified so as to increase the width to 400 feet by removing an additional 100 feet from the western side. In 1888 a further additional width of 40 feet on the western side was authorized. This 440 foot channel was completed during the fiscal year ended June 30, 1891. The estimated cost of a 400 foot channel was \$1,374,500. The total amount expended up to June 30, 1891, was \$702,122.04 for a channel of 440 feet.

In 1899 the United States Congress made provisions in the River and Harbor Act for a channel of 21 feet deep from Detroit to Lake Erie. The distance from Detroit to deep water in Lake Erie is about 24 miles, but the section of the river, which required any considerable improvement to secure a safe and convenient channel 21 feet deep, was from near the upper end of Grosse Isle to the Detroit River lighthouse in Lake Erie. All improvements made up

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to 1900 have been confined to this section of the river. The improved channel passed east of Grosse Island, Bois Blanc Island and was in Canadian waters according to the international boundary line established by the treaty of August 9, 1842. That channel was not a convenient one for the enormous commerce coming through it. The United States War Department decided to make further improvements, and in the River and Harbor Act of June 13, 1902, the works now in way of construction were authorized. The plan was to continue operations in the channel then under improvement, so as to complete it with a low water depth of 21 feet and a minimum width of 600 feet, the side line of excavation being so located as to make the channel as straight as practicable, and especially to eliminate the dangerous bends between the head of Limekiln Crossing and Bois Blanc Island. The width of the channel, when completed, will be 800 feet opposite Bar Point, and will be continued at that width out into Lake Erie. The cost of this excavation was at first estimated to be from \$1,750,000 to \$2,000,000; but the final estimate exceeds the original approximate estimate by nearly \$2,000,000.

During the season of navigation of 1905 the Ballards reef channel had a clear depth of 21 feet and a width of 600 feet. At Limekiln Crossing the width of the channel available to navigation was 420 feet, with a least depth of 19 feet. In the Bois Blanc Range channel there was a clear depth of 20 feet and a width of 600 feet. The Amherstburg Beach channel has also a clear depth of 20 feet, but it is only 250 feet wide. The Hackett Range channel has a least depth of 19 feet, with a width of 500 feet for the greater part of its length. During the season of 1905 the west half of this channel was partly obstructed by improvements in progress. The Bay Point shoal channel extends to the Detroit River lighthouse and is 800 feet wide, with a depth of 20 feet.

The United States Government has proceeded with the improvement of the Detroit River without reference to the International boundary line between the United States and Canada, and this since 1874 to the present time. In 1892 and 1893 there were negotiations between the Government of Canada and the Government of the United States in regard to the improvement made by the United States Engineers at the Limekiln Crossing. Mr. W. J. Thompson, C. E., made, under the direction of the Minister of Railways and Canals, a report on the subject, and pointed out that the maps of the Commissioners appointed under the Treaty of Ghent (1814) place the improved channel at the Limekiln Crossing exclusively in Canadian waters. This view, however, was not adopted by the Chief of Engineers of the United States Army, who, in a report dated November 14, 1888, had already stated that "all the channels opened by the United States at the Limekiln Crossing were in American waters, except the extreme north-east and south-east corners of the cut." By Article VII. of the Treaty of 1842, it was provided as follows:--

"It is further agreed that the channels in the River St. Lawrence on both sides of the Long Sault Islands and of Barnhardt's Island, the channel in the River Detroit on both sides of the island of Bois Blanc, and between that island and both the American and Canadian shores, and all the several channels and passages between the various islands lying near the junction of the River St. Clair, with the lake of that name, shall be equally free and open for the ships, vessels and boats of both parties." This provision, while disposing by the concession of mutual rights in the channels of the difficulties of boundary at the islands named, does not affect the boundary line south of those islands, nor does it affect the Limekiln Crossing, which lies north of them. This is the view taken by the Canadian Government in 1893, when the United States Government made application to be allowed to proceed with the improvement of the Limekiln Crossing in Canadian waters. The Government of Canada in 1875 had itself assisted to the extent of \$5,000 in the works of improving the navigation of Detroit River, and on August 8, 1893, the Governor-

General-in-Council gave authority to the United States to proceed with the work of removing obstructions in the river, irrespective of the boundary line, such authority to be understood expressly as being given without prejudice to the possessory rights of Canada as defined by the maps and declarations of the Commissioners under the Treaty of Ghent. This makes of the Limekiln Crossing a channel common to both countries.

In concluding, it might be interesting to give a comparison between the freight traffic of the Detroit River, the Soo and Welland Canals.

In regard to the traffic of the Detroit River, it may be said that it has been comparatively measured, for the first time, during the past season of navigation. The compilation of the figures is founded on reports of masters of vessels, which are filed with the United States Department of Commerce and Labour through its Bureau of Statistics, and it covers the season of lake navigation of the calendar year 1905. The results are shown as follows:—

Month.	South Net Tons.	North Net Tons.	Total Net Tons.
April.....	1,575,877	792,711	2,368,588
May	4,551,972	1,352,524	5,904,496
June.....	5,523,021	1,780,541	7,303,562
July.....	5,911,625	1,941,534	7,853,159
August.....	6,300,003	2,314,810	8,614,813
September.....	4,597,640	1,493,059	6,090,699
October.....	5,582,689	1,522,905	7,105,594
November.....	4,593,752	1,578,375	6,172,127
December.....	1,354,506	871,542	2,226,048
	<hr/> 39,991,085	<hr/> 13,648,001	<hr/> 53,639,086

The southbound movement is nearly three times as great as that in the opposite direction. This is largely due to the enormous eastbound tonnage of iron ore from upper lake ports to ports along the southern shore of Lake Erie, whence it is shipped by rail to the great iron and steel districts of southern Pennsylvania. The freight carried in a southerly direction through Detroit River during the past season of lake navigation is divided as follows:—

Flour.....	3,176,928 tons.
Ore and minerals, exclusive of coal, of which there was no southbound movement.....	32,900,685 tons.
Lumber.....	1,851,324 tons.
Unclassified freight.....	971,151 tons.
The northbound movement is divided as follows:—	
Coal.....	11,928,158 tons.
Grain and flax seed.....	6,178 tons.
Ore and minerals.....	415,533 tons.
Lumber.....	11,940 tons.
Unclassified freight.....	1,286,192 tons.

The traffic through the Soo Canals, which connect Lake Superior with the other Great Lakes, and through the Welland Canal, which performs the same duty for Lake Ontario, has largely increased during the past season of navigation.

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Here follows a statement showing the traffic through the Canals at Sault Ste. Marie, for the years 1896 to 1905, inclusive:—

Season.	South Net Tons.	North Net Tons.	Total Net Tons.
1896.....	16,239,061
1897.....	18,982,755
1898.....	21,234,664
1899.....	20,619,534	4,636,276	25,255,810
1900.....	20,532,493	5,110,580	25,643,075
1901.....	23,087,742	5,315,323	28,403,065
1902.....	30,275,989	5,685,157	35,961,146
1903.....	26,932,238	7,742,199	34,674,437
1904.....	24,213,902	7,332,204	31,546,106
1905.....	36,778,738	7,491,942	44,270,680

During the season of lake navigation of the calendar year 1905, the total freight movement through the United States Canal amounted to 38,802,190 tons, while that through the Canadian Canal totaled 5,468,490 tons.

It will be seen that, during the lake season of 1905, the difference between the amount of freight carried, respectively, through the Detroit River and the two Soo Canals is 9,368,406 tons in favor of the former. This may be said to represent, at least with a fair degree of accuracy, the traffic through the Straits of Mackinac, which consists largely of shipments of grain and flour from Chicago and iron ore from Escanaba, while the west bound cargoes consist largely of coal and package freight.

The following table represents the volume of traffic between Lake Erie and Lake Ontario by way of the Canadian Welland Canal, which runs parallel with the Niagara River:—

Season.	Down Tons.	Up Tons.	Total Tons.
1894.....	745,942	243,592	989,534
1895.....	621,926	230,100	852,026
1896.....	957,928	285,667	1,243,595
1897.....	1,026,458	218,292	1,244,750
1898.....	902,590	218,211	1,120,730
1899.....	622,104	147,514	769,618
1900.....	579,312	109,245	688,557
1901.....	501,935	89,311	591,236
1902.....	567,286	78,811	646,097
1903.....	715,595	263,212	979,807
1904.....	620,078	182,402	802,480
1905.....	848,007	227,961	1,075,968

Respectfully submitted,

(Signed) THOMAS CÔTÉ,
Secretary.

Ottawa, Dec. 1, 1905.

INTERIM REPORT
OF THE
AMERICAN SECTION

APPENDIX "A1".

INTERNATIONAL WATERWAYS COMMISSION

(Office of American Section)

328 FEDERAL BUILDING,

BUFFALO, N. Y., December 1, 1905.

MR. SECRETARY,—1. The American section of the International Waterways Commission has the honor to submit the following progress report:

2. The River and Harbour Act, approved June 13, 1902, contained the following provision, viz:—

"Section 4. That the President of the United States is hereby requested
" to invite the Government of Great Britain to join in the formation of an inter-
" national commission, to be composed of three members from the United States
" and three who shall represent the interests of the Dominion of Canada, whose
" duty it shall be to investigate and report upon the conditions and uses of the
" waters adjacent to the boundary lines between the United States and Canada,
" including all of the waters of the lakes and rivers whose natural outlet is by
" the River St. Lawrence to the Atlantic Ocean; also upon the maintenance
" and regulation of suitable levels, and also upon the effect upon the shores of
" these waters and the structures thereon, and upon the interests of navigation
" by reason of the diversion of these waters from or change in their natural flow;
" and, further, to report upon the necessary measures to regulate such diversion,
" and to make such recommendations for improvements and regulations as
" shall best subserve the interests of navigation in said waters. The said Com-
" missioners shall report upon the advisability of locating a dam at the outlet
" of Lake Erie, with a view to determining whether such dam will benefit navi-
" gation, and if such structure is deemed advisable, shall make recommendations
" to their respective Governments looking to an agreement or treaty which
" shall provide for the construction of the same, and they shall make an estimate
" of the probable cost thereof. The President, in selecting the three members
" of said Commission who shall represent the United States, is authorized to
" appoint one officer of the Corps of Engineers of the United States Army, one
" civil engineer well versed in the hydraulics of the Great Lakes, and one lawyer
" of experience in questions of international and riparian law, and said Com-
" mission shall be authorized to employ such persons as it may deem needful
" in the performance of the duties hereby imposed; and for the purpose of paying
" the expenses and salaries of said Commission, the Secretary of War is authorized
" to expend from the amounts heretofore appropriated for the St. Marys River
" at the Falls the sum of twenty thousand dollars, or so much thereof as may
" be necessary to pay that portion of the expenses of said Commission chargeable
" to the United States."

3. The invitation here authorized was duly communicated to the Government of Great Britain by the American Ambassador in London by letter dated July 15, 1902 (copy appended, marked "A", page 19), and was accepted by letter from the British Foreign Office, dated June 2, 1903. The American members were appointed October 2, 1903; they were Colonel O. H. Ernst, Corps of Engineers, United States Army; Mr. George Clinton, of Buffalo, N. Y., and Prof. Gardner S. Williams, of Ithaca, N. Y. The Canadian members were appointed on January 7, 1905; they were Mr. W. F. King, Chief Astronomer, of Ottawa; Mr. J. P. Mabey, K. C., of Toronto, and Mr. Louis Coste, C. E., of Ottawa.

4. The American section held its first meeting in Washington, D. C., May 10, 1905, and organized by the election of Colonel Ernst as chairman. The scope of the investigations to be undertaken was defined in a letter from the

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Department of State, dated April 15, 1905 (copy appended, marked "K", page 23), from which the following is an extract, viz.:—

"The wording of the law will be seen by reference to the inclosed copy.
" The Department's opinion is that the words, 'including all of the waters of
" 'the lakes and rivers whose natural outlet is by the River St. Lawrence to the
" 'Atlantic Ocean,' are intended as a limitation on what precedes them, and
" that the investigation and report should only cover such waters, omitting
" the lower St. Lawrence itself, as well as all other waters not discharging natur-
" ally through it.

"The broader interpretation given to the Act by the Canadian authorities
" should be rejected, if for no other reason, on account of the smallness of the
" appropriation for the support of the American section. Congress could hardly
" have intended to provide, with a sum of \$20,000, for the expenses incident to
" an investigation extending to the Pacific Coast, and possibly embracing the
" Alaskan boundary as well."

It was learned informally that the British Government objected to this limited interpretation of the law and had requested a reconsideration of the question, and that the matter had been referred to the Attorney-General. In a conference with the Honourable Secretary of War, it was decided that the work of the Commission should be under the War Department. It was also decided to invite the Canadian members to join in the first full meeting of the Commission in this city, to be held May 25, and an invitation was issued accordingly by the Department of State at the request of the Secretary of War.

5. On the 25th of May the full Commission held its first meeting in this city, and organized by the election of Colonel Ernst as chairman of that meeting, it being agreed that at meetings of the full Commission held on American territory the chairman of the American section should preside, and at meetings held on Canadian territory the chairman of the Canadian section should preside. The Commission remained in session during the 25th and the following day, discussing the organization, permanent place of meeting, and scope of their duties. It was decided that for the present the offices of the Canadian section should be established in Toronto, and those of the American section in Buffalo, and that full meetings should be held in one or the other city, as should be found most convenient.

6. The American section, having presented the instructions under which they were acting, quoted above, the Canadian section presented the following memorandum, viz.:—

"The Canadian members of the International Waterways Commission had
" understood the scope of the Commission to be wider than the American mem-
" bers regard it, and that any misunderstanding may be avoided desire briefly
" to state the position they have understood matters to be in.

"The invitation to His Majesty's Government, through the American
" Ambassador in London, was 'for the appointment of an international com-
" mission, to be composed of three members from the United States and three
" 'who shall represent the Dominion of Canada, whose duty it shall be to in-
" 'vestigate in general the waters adjacent to the boundary line between the
" 'United States and Canada, the effect upon the shores produced by changes in
" 'the water levels, and the erection and location of a dam at the outlet of Lake
" 'Erie.'

"In due course, by a report of the Committee of the Privy Council of Canada,
" approved by the Governor-General of Canada, it was resolved 'that His
" 'Majesty's Government accept the invitation to co-operate in the formation
" 'of the Commission.' This report, after further reciting that as the subjects
" to be dealt with pertained to 'the regulations of the waters adjacent to the
" 'international boundary,' the matter, in so far as Canada was concerned, should
" be under the Department of the Interior and the Department of Public Works.

“Some regrettable but unavoidable delay in completing the Canadian section of the Commission arose by the long-continued illness of the Honourable the Minister of Public Works for Canada.

“In the dispatch to the Government of Great Britain naming the American Commissioners, the invitation to His Majesty's Government is again recited as being one to form an international commission to investigate and report upon the conditions and uses of the waters adjacent to the boundary lines between the United States and Canada.

“After the appointment of the Canadian Commissioners, the Prime Minister of Canada, Sir Wilfrid Laurier, in communicating the matter to the Canadian House of Commons, in January last, dealt with the subject-matter of the Commission as covering all waters adjacent to the boundaries of the two countries, and in the course of his speech made the following statements: ‘In sections of the country where the boundary is not water, but land, there are streams and large rivers which have their sources in one country and which flow into another. Complaint has been made by the United States that Canadians have constructed some works upon rivers which have their sources in Canada and which flow into the United States, and that these works affect the flow of the waters in their country. We also have made complaints to the United States that Americans have constructed upon some rivers, the St. John River, for instance, works which affect the flow of the waters in our country. It is, therefore, to the mutual interest and advantage of both countries to have this question properly investigated with a view of having concurrent legislation, if such should be found necessary. From olden times it has been a principle of Roman law, which has been adopted by most civilized nations, that the riparian owner of any stream has the right to use the water of that stream for his own benefit, provided he does not impair the flow of the water beyond the boundary of his property. This is a principle of law which dominates in almost every country; but it is not possible to have this principle followed and carried out when the works are in one country and the boundary of the property is in another country. For these reasons we have thought it advisable to respond to the invitation of the United States to have this question investigated. We have agreed to a Commission to be composed of six members, three to represent the Government of the United States and three to represent the Government of Canada.’

“If the inquiries of the Commission are to be limited to the waters of the Great Lakes only, it would seem that the Government of Canada has been under misapprehension as to the desires and intentions of the Government of the United States, and we regard it as our duty to report to our Government the limitations expected to be placed upon the scope of the Commission, and we respectfully suggest that further action should be delayed until we may be advised of the views of the Government of Canada upon the premises.”

7. The chairman of the American section stated that he was informed that the British Government had communicated with the American Government, through diplomatic channels, requesting that the broader interpretation above described be given to the law of Congress providing for the Commission, and that the American Government then had the matter under consideration, but that some days would probably elapse before a decision could be expected. It was then decided that further proceedings be deferred until further instructions be received from the two Governments. It was agreed that the decision of the American Government should be communicated to the chairman of the Canadian section as soon as received, and that if it be favorable to the Canadian interpretation of the law, or if it be unfavorable, and be accepted by the Canadian Government, then a meeting of the Commission should be called on Canadian territory by the chairman of the Canadian section at as early a date as the other duties of the members would permit.

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8. The decision of our Government was given in a letter dated May 31, 1905, from the Department of State to the British Ambassador at this capital (copy appended, marked "E", page 28), and was in effect to leave the instructions to the American members unaltered. It was immediately communicated to the Canadian section by letter, dated June 2, 1905 (copy appended, marked "R", page 31), and was by them laid before the Canadian Government, which Government, after due consideration, authorized the Canadian members to proceed with the work of the Commission within the field prescribed to the American members. See letter from the chairman of the Canadian section, dated June 7, 1905 (copy appended, marked "S", page 32).

9. The American section then proceeded to complete its organization. Through the courtesy of the Honourable Secretary of the Treasury, excellent quarters in the Federal Building in Buffalo were assigned to its use, completely furnished and arranged with temporary partitions to suit its convenience in every respect. These rooms became available September 11. The section was fortunate enough to secure the services as secretary of Mr. L. C. Sabin, a hydraulic engineer of many years experience on the Great Lakes in the service of the Government. He reported for duty August 1. Professor Williams, finding that business engagements, contracted since his appointment in October, 1903, would interfere with his performance of duty as a member of the Commission, tendered his resignation, and was replaced by Mr. G. Y. Wisner, civil engineer, appointed June 8, 1905.

10. The full Commission held its second meeting at Toronto, June 14 and 15, 1905. Among the questions brought to the attention of the Commission at this meeting were the following, viz:—

(a) The uses of the waters at Sault Ste. Marie for power purposes, and the regulations necessary to insure an equitable division of the waters between the two countries and the protection of the navigation interests.

(b) The uses of the waters in the Niagara River for power purposes, and the regulations necessary to insure an equitable division of the waters between the two countries, and the protection of Niagara Falls as a scenic spectacle.

(c) The alleged differences in the marine regulations of the two countries with respect to signal lights, and the advisability of adopting uniform signals for both countries.

(d) The advisability of building controlling works at the outlet of Lake Erie, including the effect upon the levels of the lakes and upon their shores, and upon the River St. Lawrence.

(e) The diversion southward by the Minnesota Canal and Power Company, of Duluth, of certain waters in the State of Minnesota that now flow north into the Rainy River and the Lake of the Woods.

(f) The effect of the Chicago Drainage Canal upon the levels of Lakes Michigan, Huron, Erie and Ontario, and upon the River St. Lawrence.

(g) Delimiting the international boundary on the international waterways and delineating the same on modern charts.

11. At subsequent meetings the following additional questions were brought to the attention of the Commission, viz.:—

(h) The suppression or abatement of illegal fishing on the Great Lakes.

(i) The location and construction of common channels.

(j) Regulations to govern navigation in narrow channels.

(k) Protection of shores from damages due to deepening of channels and increased speed.

12. It was immediately evident that, in addition to collecting the data known to exist bearing upon these questions, it would be expedient for the Commission to make its existence known to the persons most interested in the international waterways, to receive suggestions from them, and to visit in person

some or all of the principal localities concerned, giving public hearings where such hearings were desired by the local business interests.

13. On the 7th of July the Commission paid a visit of courtesy to the Canadian Government, at Ottawa, and were the recipients of many graceful attentions from the authorities. Between the 9th and 13th of July the Commission passed over the St. Lawrence River and Canals from Quebec to Kingston, using the steamer "Frontenac," kindly placed at their disposal by the Canadian Government. During August, a majority of its members visited the Detroit, St. Clair and St. Marys Rivers, and the Sault Ste. Marie. Between the 11th and 14th of September, the full Commission made an inspection of the outlet of Lake Erie, including Buffalo Harbour and Niagara River above the Falls, and of the water-power development at Niagara Falls. Public hearings were held at Montreal, July 11; at Kingston, July 13; at Niagara Falls, September 14; at Toronto, September 15; at Hamilton, Ontario, September 16; and at Buffalo, November 10.

14. The meetings of the full Commission were held at Buffalo, October 27 and 28, and November 10 and 11. To enable all persons to appear before the Commission or to address it, who desire to do so, public notice of all meetings is given as long in advance as possible, through the press of the principal cities of the Great Lakes and St. Lawrence system.

15. Of all the questions brought to the attention of the Commission, those most pressing for consideration were the questions relating to the uses of water at the Sault Ste. Marie. The situation there, in brief, is this: The volume of water flowing out of Lake Superior is, at normal low water elevation 601, about 64,000 cubic feet per second. Lower stages and a lower discharge have sometimes occurred. On either side of the rapids is a navigation canal, constructed by the United States and Canadian Governments, respectively.

The traffic through these canals has reached enormous proportions and is increasing. It is larger this year than ever before, and will greatly exceed 40,000,000 tons for the year. The quantity of water consumed in the operation of the canals during the eight months of navigation is about 1,200 cubic feet per second. The quantity required in the future will be greater. Not less than 4,000 cubic feet should be unconditionally reserved for canal uses, and in granting power privileges, the respective Governments should not forfeit the right to increase the amount indefinitely. It may be remarked, in passing, that raft navigation over the rapids has so greatly diminished and it is now so small in amount that the quantities of water above mentioned will suffice to provide for it. This leaves about 60,000 cubic feet which may be temporarily used for power purposes.

16. On the Canadian side the Lake Superior Power Company has a power canal in operation which has a capacity of about 9,000, and is using about 7,000 cubic feet per second. This Company has designed an additional canal, not yet constructed, which will have a capacity of about 23,000 cubic feet per second. On the American side the Michigan Lake Superior Power Company has in operation a power canal, which has a capacity of about 31,000, and is using about 8,500 cubic feet per second. This canal takes the water from the St. Marys River above the rapids, conducts it through the city of Sault Ste. Marie, Michigan, and empties it about a mile below the rapids. On the American side also the Chandler-Dunbar Company, owning a portion of the shore line adjoining the rapids, have in operation power works using about 1,400 cubic feet per second. This Company is engaged in altering and improving its works in the bed of the stream, under revocable permits from the War Department.

Under permits thus far granted, the consumption of water will be increased to about 3,000 cubic feet per second, but in March, 1902, the Company applied for a permit to build a dike downstream from the fourth pier, counting from the American side of the international bridge in a direction nearly parallel

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with the shore, to connect with a power house extending out an equal distance into the stream. A rival company, the St. Marys Power Company, applied in March, 1903, for permission to construct a power canal by means of two parallel dikes extending downstream and a short distance upstream, from the third and fifth piers of the bridge, with corresponding power house. Neither of these latter requests was granted, but they show what the intentions of the companies are, if they be permitted to carry them out. Evidently there is not water enough to carry out all of these schemes. An understanding must be reached by which there shall be an equitable division of the surplus water between the two sides of the boundary. The division between rival companies, fortunately for the Commission, may be left to the courts of law.

17. The applications to the War Department of the United States from the American companies for further privileges and an application from the Lake Superior Power Company to the Canadian Government for additional authority, led the Commission, at its session of October 28, to pass the following resolution, of which copies were sent to the Secretary of War of the United States and the Minister of Public Works of Canada, viz.:—

“RESOLVED, That in the opinion of the Commission, no further rights
“ or privileges should be granted or conferred regarding the uses or diversions
“ of the water flowing out of Lake Superior, by either the Government of the
“ United States or Canada, until all data and information are in the hands of
“ the Commission that may be necessary to enable it to make suggestions for
“ regulating the excess of these waters, or that, if such rights or privileges be
“ granted, they be subject to any regulations that may be adopted by both
“ Governments.”

18. The use of water for power purposes must be so regulated as not to affect injuriously the level of Lake Superior. On the one hand, the level must never be allowed to fall so low as to injure navigation; and on the other hand, it must never be raised so high as to submerge the shores.

19. The Act of Congress, approved June 13, 1902, authorized the Michigan Lake Superior Power Company to divert water from St. Marys River above the rapids, with certain conditions, among which is the following, viz.:—

“And conditioned further, that said Company shall establish, maintain,
“ and operate suitable and sufficient remedial and controlling works in the
“ rapids of said river, to the approval of the Secretary of War and the Chief of
“ Engineers; and said Company shall maintain and operate said canal and
“ works in accordance with any rules and regulations that may hereafter be
“ recommended by any international commission and that shall become opera-
“ tive.”

A full copy of the proviso will be found at page 11. In this legislation the principles were recognized that the use of the water was not granted in any fixed quantity nor for any fixed length of time, but that the Secretary of War could enter upon the property and close the canal in whole or in part at any time to the extent necessary to maintain water levels; also that it should finally be regulated by an international commission.

In granting permission to the Company under this Act to divert water, the Secretary of War established, December 2, 1902, certain regulations (copy appended, marked “T”, page 33), which are still in force and which will probably be used by this Commission as a foundation in framing the regulations to be recommended. The fundamental principles on which they are based, and which this Commission believes to be sound, are: (1) levels must be maintained; (2) navigation must be protected; (3) the public must reserve the right to use any portion or all of the natural flow in the future.

20. A public hearing, at which the parties in interest were given an opportunity to be heard, was held in Buffalo, November 10, and at its session of

November 11, 1905, the Commission tentatively adopted certain rules and regulations, which it is hoped can be forwarded for approval at an early day.

21. The enforcement of these rules and regulations calls for the executive action from time to time of an international commission. The enforcement of rules to be established hereafter at other places or upon other subjects will probably likewise require joint executive action. It is not clear from the language of the law creating this Commission that Congress intended to provide for a permanent international board. It is desirable that the status of the present Commission as a permanent executive board be defined, or a new board be created.

22. The questions which have been brought to the attention of this Commission, enumerated above in paragraphs 10 and 11, cover a wide range of subjects. Some of them clearly come under the jurisdiction of the Commission as constituted, while some do not, and about others there is room for doubt. The Canadian members of the Commission are ready and anxious to consider all of these questions and to extend the jurisdiction of the Commission to all international waters between the Atlantic and Pacific Oceans. It is desirable that the wishes of Congress in this matter be more clearly defined.

23. Since it completed its organization in September, the Commission has made good progress in the collection of data bearing upon some of these questions, particularly those relating to the use of water at Niagara Falls, and to the regulation of the level of Lake Erie by works near its outlet. With reference to the former, although not ready to report, it thought proper to pass, at its session of October 28, the following resolution, of which copies were sent to the Secretary of War of the United States, and the Minister of Public Works of Canada, viz.:—

“RESOLVED, That this Commission recommends to the Governments
“ of the United States and Canada that such steps as they may regard as neces-
“ sary be taken to prevent any corporate rights or franchises being granted or
“ renewed by either Federal, State or Provincial authority for the use of the
“ waters of the Niagara River for power or other purposes, until this Commission
“ is able to collect the information necessary to enable it to report fully upon
“ the ‘conditions and uses’ of those waters to the respective Governments of
“ the United States and Canada.”

24. To enable it to continue its investigations, an additional appropriation will be required. Very respectfully,

(Signed) O. H. ERNST, *Chairman, American Section.*

(Signed) GEORGE CLINTON,

(Signed) GEORGE Y. WISNER. *Members, American Section.*

HON. WM. H. TAFT, Secretary of War, Washington, D. C.